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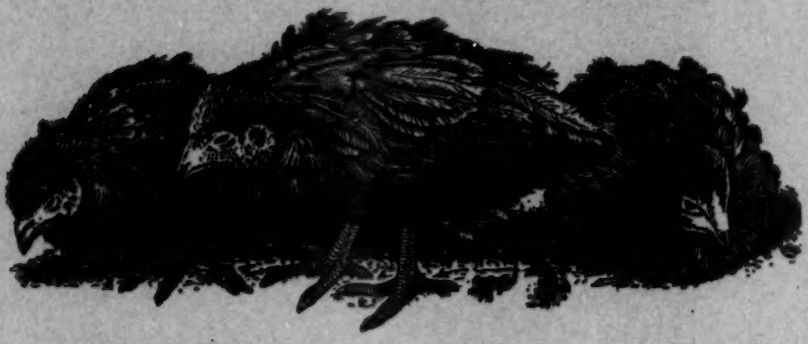

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TENTH WORLD'S POULTRY CONGRESS
EDINBURGH, SCOTLAND, AUGUST 13-21, 1954

The Department of Agriculture for Scotland report that good progress is being made with the organizational arrangements for the Tenth Congress.

In this work the Department are receiving the wholehearted co-operation and support, not only of all those trade organizations which are directly connected with the poultry industry in Scotland, but of other bodies not so connected but who nevertheless have an interest in the wellbeing of the industry and who feel that they might in one way or another be able to contribute to the success of the Congress. The Department would wish to place on record their appreciation of this very valuable assistance.

Members of the Asosciation will no doubt have received a copy of the Congress Preliminary Announcement either through their national branch of the Association or their National Committee. It would greatly facilitate the work of the organizing Committees if members intending to participate in the Congress would hasten submission of membership applications, papers, and particulars of accommodation and travel requirements.

The organizers would be glad if those countries which have not yet set up a National Committee would do so as early as possible so that they may render all assistance possible in furthering the success of the Congress.

Appended, for the information of members, is a list of those serving on the central organizing Committee. Recent interesting appointments to this Committee are The Right Honorable Lady Elphinstone, sister of H.M. Queen Elizabeth the Queen Mother, and Mrs. M. E. Campbell, C.B.E. who have accepted office as Chairman and Vice-Chairman respectively of the Committee whose special function it will be to look after the interests of the ladies attending the Congress.

The organizers are happy to be able to intimate that they have received the cordial support of the President of the Lederle Laboratories, New York to a proposal that Dr. Jukes of that organization should be invited to attend the Congress and deliver, in person, at the opening plenary session a paper on nutrition, and of the President of the University of California, to a proposal that Professor Lerner of that Univer-

sity should similarly be invited to deliver a paper on genetics. The invitations have been accepted by Dr. Jukes and Professor Lerner. It is hoped to secure the presence of another eminent research specialist to deliver the third paper to be given at the opening plenary session.

Although on the occasion of this the Tenth Congress the exhibition is to be devoted almost entirely to displays illustrative of the Scottish poultry industry and of the work of the Scottish agricultural colleges and research centers, the organizers are confident that it will prove both informative and attractive to visitors. A very satisfactory response has been received from exhibitors in the various sections. The Scottish Association of Young Farmers' Clubs are giving active support in the staging of the demonstrations.

The programme of hospitality and entertainment is being steadily built up. It now includes, in addition to the activities shown in the Preliminary Announcement, a special Scottish evening (with dancing) at the Congress Social Club and an evening visit to a spectacular musical comedy on ice. Other interesting events are being planned.

The tours, which on this occasion are to take place before the Congress, are being arranged so that those participating will, as well as visiting interesting poultry centers, see as much as possible of Scotland's scenic beauty and places of historical interest.

Day tours have now been arranged for Sunday, 15th August, one to the countryside of Robert Burns, Scotland's national bard, including a visit to the Poultry School of the West of Scotland Agricultural College at Auchincruive, Ayrshire, and another to the Trossachs, in the central Highlands, made famous by the writings of Sir Walter Scott. Many offers of hospitality for members have been received from organizations in Edinburgh and neighborhood.

A booklet giving full details of the tours and visits will be supplied to all those applying for Congress membership or on request to the Congress Secretariat in Edinburgh.

In conclusion, the organizers would wish to pay tribute to the valuable advice and co-operation they are receiving from Major Ian Macdougall, O.B.E. the Association's Secretary and Assistant Treasurer, who is a frequent attender at their meetings.

Scottish Central Organizing Committee for the Tenth World's Poultry Congress

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J. E. Wilson—Chairman of the Papers and Sessions Committee. Director of the Veterinary Laboratory in Scotland of the Ministry of Agriculture and Fisheries.

Professor S. J. Watson.—Vice-Chairman of the Papers and Sessions Committee. Professor of Agriculture at Edinburgh University and Principal of the Edinburgh and East of Scotland College of Agriculture.

T. E. Whittle—Chairman of the Exhibition Committee. Head of the Poultry School of the West of Scotland Agricultural College.

J. G. Penny, M.B.E.—Vice-Chairman of the Exhibition Committee. Representative of the Poultry Association of Great Britain.

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J. Macpherson, D.F.C.—Vice-Chairman of the Reception, Entertainments, etc. Committee. Assistant to the Secretary of Edinburgh University.

William Adair, O.B.E.—Chairman of the Press and Propaganda Committee. Editor of Farming News.

R. D. Marshall—Vice-Chairman of the Press and Propaganda Committee. Representative of the National Farmers' Union of Scotland.

Miss M. M. MacLeod—Chairman of the Tours and Passenger Transport Committee. Senior Inspector (Poultry) with the Department of Agriculture for Scotland.

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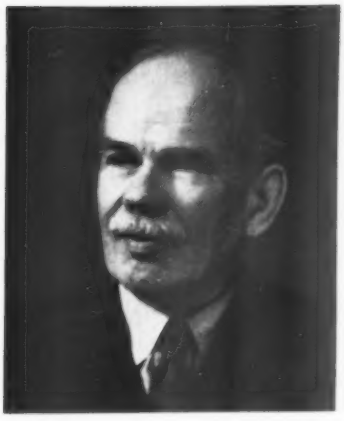
THE PLACE OF POULTRY IN SCOTTISH FARMING

SIR PATRICK R. LAIRD, K.B.E., C.B., F.R.S.E.
President, Tenth World's Poultry Congress

Farming in Scotland is traditionally of a mixed type depending largely upon livestock production and fodder cropping. At the present time, as before the war, livestock products account for almost 80 per cent of the value of the total agricultural output. This proportion never fell below 60 per cent even during the war years when there was a substantial increase in cash crop production and a severe reduction in imported feeding stuffs supplies.



The types of farming in Scotland are chiefly characterized by the kind of livestock production undertaken, and it is possible to identify five agricultural regions in which particular farming types are predominant. In the Highland Counties hill sheep farming, whether in large units or in the crofting communities, is the dominant enterprise; in the North East, including Orkney, cattle feeding and rearing; in the East mainly arable farming asosciated with livestock feeding; in the South West mainly dairying; in the Border counties semi-arable farming and hill sheep.

In all there are roughly 32,000 full-time farms in Scotland and, in addition, 26,000 part and spare-time holdings over one acre. The typical Scottish farm has about 150 acres of enclosed land plus some rough grazing.

The proportions of farmers' gross receipts derived from the main products of Scottish farming in 1952-53 were:

	Percent of total receipts
Milk and Milk Products	27.4
Cattle and Calves	17.0
Sheep (including wool)	13.4
Eggs and Poultry	12.3

Pigs	9.5
Potatoes	8.0
Cereals (wheat, barley and oats)	7.3
Fruit and Vegetables	3.5
Other Products	1.6
Total	100.0

Poultry's percentage contribution to the output and her fowl population have more than doubled in the last thirty years, though in comparison with some other countries such as Northern Ireland, Eire, Denmark, Canada and the U.S.A., in regard to the number of fowls per head of population—1.9 fowls on holdings over one acre—Scotland like England takes a relatively low place. This is not surprising concomitant of the pressure of population on the land.

The increase in numbers is, of course, only one factor in the development of the industry in recent times. To appreciate the changes fully it is worth while to cast an eye back to the Statistical Account of Scotland compiled in the late 18th and early 19th centuries, which gives many informative pictures of agricultural conditions in those times, and none more illuminating than those of the status of poultry-keeping.

"Dunghill fowls, and sometimes ducks," writes one recorder in Lanarkshire, "are found in all the farmyards. The former are particularly inimical to the kitchen garden and the corn field, both in spring and autumn; and for that reason are commonly the destation of husbandmen, who think the injuries they do at these times are greater than all the value they yield through the year. The housewife, however, reckons most on the profit and conveniency of fowls and eggs, which of late have sold very high; and under this favor they are sheltered and preserved."

The price is not quoted, but elsewhere we read of a price per fowl of from 1s. to 2s. 3d. (Midlothian), the advancing price being "to the great regret of the honest burghers, who are thus reluctantly abridged in their inclination to indulge in such delicacies"; or of 9d. to 1s. for hens and 4d. to 6d. for chickens (Roxburghshire); of eggs at 6d. per dozen in Dumfriesshire, or up to 1s. per dozen in Aberdeen. In Caithness a figure as low as 3d. per dozen is mentioned.

An East Lothian recorder observes that common barndoor fowls can never be kept, without a positive loss, beyond the number sufficient to pick up the lost grain; it would be

impossible, he says, to feed them in any manner except at a cost greater than any return. "Farmers should endeavor to diminish the number of these unthrifty creatures. It is not perhaps understood by the advocates for poultry that they consume three times as much food as they produce."

It is apparent from these old records that poultry-keeping was incidental to other enterprises; but that it was almost universal and associated with the common practice of paying a substantial part of farm-rents in kind. Kane-hens, as they were called, were demanded both by landlords from farmers and in some cases by farmers from their cottagers.

Although the kane-hen has long since disappeared from the scene, it is significant that as lately as 1947 it was estimated that 94½ per cent of the total poultry on agricultural units were on general farms along with other main enterprises. Specialist poultry farms only accounted for roughly 5½ per cent of the total poultry. Most of the flocks on general farms were comparatively small—in 1947 88 percent of all birds on farms were in flocks too small to employ one man full time. Since 1947 there has undoubtedly been an increase in the number of larger scale intensive units but these remain largely part of the general farm. Nevertheless, the majority of birds are still kept in small to moderate size flocks, although the indications are that the trends towards larger intensive enterprises will continue. Stock rearing and feeding farms, and those engaged in stock rearing alone, accounted between them in 1947 for 43 per cent of the total poultry population. Nearly 5 million head of poultry—over 47 per cent of the total—are found in the North East region, and of that number 75 per cent are in Aberdeenshire and Orkney. To a large extent this is due to the considerable supplies on farms in this region of home-grown feeding grain, chiefly oats; but the value of poultry as a source of cash income on farms predominantly engaged in cattle breeding and rearing has also been a considerable stimulus.

The increased importance of poultry production has depended not only upon greater poultry numbers but also upon the substantial rise in average yield of eggs per bird since the beginning of the century. While estimates of egg yields are subject to large errors, especially before the recent days of controlled market and recorded sales, it is probable that the average yield rose from roughly 100 eggs per bird fifty years ago to nearly 150 eggs immediately before the war. During the

war years the yield fell to roughly 130, but a substantial recovery has taken place in recent years and the present average yield is estimated to be near the pre-war figure.

Considering the severe restrictions imposed on imports of feeding stuffs during and since the war* and the priority accorded to milk, it is remarkable that the poultry population in Scotland never fell below 6 million—a figure substantially higher than in the early '20s—and in 1949 reached a peak of over 10 million.

Feeding stuffs have now been decontrolled, and the system of fixed egg-prices under the guarantees given in the Agriculture Act, 1947, has been replaced by a system of minimum prices to be determined under the same Act. The full effect of these changes (which of course apply to the whole of the United Kingdom) remains to be seen, but the lifting of restrictions should help to promote greater efficiency, on the one hand by allowing feeding stuffs to move to the most efficient producers and giving an opportunity for the development of larger scale intensive units, and on the other by relating supplies to demand through the market price.

There is no doubt that both among general farmers in Scotland, many of whom now have extensive poultry units, and amongst specialists, great interest is being taken in the various intensive methods of poultry keeping which have come so much to the fore in recent years—batteries, deep litter, and hen yards—and that much more attention is being paid to the science of breeding. In all matters of stock management and improvement ready aid and advice is given by the poultry experts in the three Agricultural Colleges, Scotland, for the purposes of agricultural education, being divided into three regions each with its Central College and Advisory staff.

On the research side we are fortunate in having the Poultry Research Center recently established in Edinburgh by the Agricultural Research Council, the Rowett Research Institute in Aberdeen and the Veterinary Laboratory of the Ministry of Agriculture and Fisheries at Lasswade, all of which are contributing much to an understanding of the complexities that beset the path of the poultry husbandman.

The industrial and organizational interests of producers are looked after by such representative bodies as the National Farmers' Union of Scotland, the Scottish National Poultry Council, the Scottish Chick Producers' Association and the

* In 1943-4 the tonnage was only 23 per cent of the pre-war average.

Poultry Association of Great Britain.

The Department of Agriculture for Scotland, in the formulation of their schemes for the Accreditation of Poultry Breeding Stations and Hatcheries, have the guidance of a Poultry Advisory Committee appointed by the Secretary of State for Scotland and charged with the responsibility for advising him on matters relating to the poultry industry in Scotland and on developments designed to improve the health and quality of the stock in the country.

Scotland has always associated itself with the objects of the World's Poultry Science Association. She has been represented at each one of the nine Congresses so far held and is honored by the opportunity of acting as host for the tenth. This Congress is exciting keen anticipation in Scotland, and will undoubtedly stimulate her to still greater scientific progress and a still greater expansion of production.

IN MEMORIAM

Professor James E. Rice, Honorary Past President 1949 to 1953, President 1940-1948, Vice-President for North America and Member of Council for the United States, died Oct. 25, 1953. Prof. Rice was an active leader in the World's Poultry Science Association for more than 35 years. He attended six of the World's Poultry Congresses at which he made many friends.

IN MEMORIAM

Professor Anita Vecchi, University of Bologna, Italy and Member of the Council of the World's Poultry Science Association from Italy.

IMPROVING THE POULTRY INDUSTRY IN TURKEY

A. CEMALETTIN AKPINAR
Ziraat Fak. Zootekni Ens., Ankara, Turkey

Poultry production in Turkey is a big business, but one that is not far removed from ancient practices of husbandry. In 1952, estimates are 20,734,000 chickens, 1,227,000 turkeys, and 1,000,000 ducks and geese. Egg exports in 1951 were 7,278 metric tons valued at 8,354,067 T.L. (Turkish Liras). This is considerably less than the peak exportation of eggs in 1948 when 9,112 metric tons valued at 14,246,000 T.L. were exported.

In 1951 the Ministry of Agriculture instigated a movement for poultry improvement in Turkey, with a plan of operation and an outlined program. A budget of $250,000 was set up for supplying stock and equipment. This equipment has been purchased and distributed to various government poultry stations. Upon the arrival in Turkey of a group of advisors from Mutual Security Agency in July 1952, they began to develop and implement the program outlined by the Ministry.

The first step was to set up a National Poultry Committee under the supervision of Prof. O. C. Ufford from Colorado A. and M. College, U.S.A. Several subcommittees are working on plans and programs for the different phases of poultry improvement in cooperation with the University of Ankara.

The National Poultry Committee will soon complete plans for a long-term poultry improvement program for Turkey.

The next step will be to complete the organization of a poultry congress for Turkey by having delegates selected from the provinces to be representatives on the congress. The first annual meeting of the congress will be called as soon as plans are completed. This first congress meeting will outline the objectives and plans for organizing poultry improvement activities in the villages, counties, and provinces.

There are already some thirty government poultry farms operated at the various institutions. American poultry specialist, Prof. Ufford, found the physical equipment, such as housing and brooding, to be generally well planned and built sometimes rather expensively. Most of the plants are operating to capacity. The quality of the stock is generally fair, but

can be much improved through an organized breeding program.

As there are no privately operated poultry breeding farms in Turkey, it will be necessary to carry on the poultry breed improvement and testing programs at the government stations. These stations will be the key to village poultry improvement for some time to come.

The breeding stock will consist of Rhode Island Reds, New Hampshires, White Leghorns, and some native breeds that are worthy of being perpetuated. The task of improving village poultry stock and production is an enormous one.. A large percentage of village flocks are a mongrel lot and will need to be replaced if an important phase of poultry improvement is to be accomplished.

Therefore, several thousand chicks and hatching eggs were imported from England and the United States in 1952. Seventeen hundred Leghorns and Rhode Island Reds came from England, and more than 3400 Leghorn, Rhode Island Red, and New Hampshire chicks were imported from the United States. Twelve hundred Leghorn eggs were imported from the United States.

The stations where imported stock is being raised have built new breeding pens for handling the breeding flocks made up of the imported stock. All of the government stations, however, have a small hatching capacity. This hatching capacity will need to be expanded as the program develops. Ten incubators with a hatching capacity of around 37,000 eggs have been purchased from the United States and delivered to designated hatching centers. There is an indication of growing interest on the part of a few individual poultrymen to purchase incubators of small capacities.

One of the industry's major problems is the development of a program for better and more balanced feeding. One of the needs for balancing the diet of poultry for economical production of meat and eggs are products that supply animal protein needs. A great deal of the products such as fish and animal meat scraps are now discarded as waste. Recently, a privately owned company and Agricultural Supply Organization have taken under consideration the establishment of a by-products industry in connection with the fish and animal slaughter business. With the development of animal by-products, it will be possible to make better balanced rations for

poultry and enable a feed industry to be developed. At the present time, there is very little balanced feeding at any of the poultry stations.

Another very important part of this program for development of the poultry industry in Turkey is the marketing of the products. The exportation of eggs has been declining since 1948. A marketing committee, however, is studying the problem and will make recommendations to the Ministry for improving conditions. There is no reason why egg exportations cannot be greatly increased through the improvement of quality and modern methods of handling. The whole marketing system from the villager to the consumer needs to be revamped. The first step is to have the villager realize that with good stock and good management practices, poultry raising can be made an important part of his farm operations.

The ultimate goal of the poultry improvement program is to improve poultry conditions in the villages and make poultry raising profitable to village farmers. With 40,000 villages in Turkey, in most of which poultry is kept, this is an enormous undertaking.

Egg exportation is only a small part of the egg business; the chickens, turkeys, ducks, and geese that are produced and consumed annually are also of considerable value. It is fair to assume that the poultry industry is worth many millions of Turkish liras to the farmers of Turkey. With improved methods of production, marketing, and merchandising, we believe that the monetary value can be greatly increased. As the industry becomes an organized business, many other allied enterprises will be the result.

The Turkish people are greatly interested in doing some thing about improving the poultry conditions of Turkey. But there is a great need for experienced poultrymen to implement the program in Turkey. There are less than half a dozen poultrymen who have had training in the United States and England, and much of their experience is rather limited. These persons, however, have the foundation for enlarging their experience and being of a great assistance in carrying on the poultry improvement program.

In conclusion, we do believe that with a well organized program the objective will be accomplished.

POULTRY RESEARCH IN DENMARK

J. BAELUM

Poultry Department, National Research Institute, Copenhagen, Denmark

In Denmark experiments with poultry are conducted by the Poultry Department of the National Research Institute. The tests are undertaken partly on the two Government Experimental Farms and partly at farms of private poultry farmers. Adjoining one of the two experimental farms mentioned there is a poultry farm, where the proper tests concerning feeding, breeding, incubation, egg quality etc. are made. Also, the Poultry Department is working together with two cooperative societies which have made a poultry farm available for tests.

Amongst the tests' objectives of recent years may be mentioned the use of deep litter, the production of broilers, the use of vitamin B_{12} and of antibiotics. As a result of the tests, the use of deep litter has been commonly adopted in Denmark, where the weather during the winter season is generally mild and moist.. So far the experiments with vitamin B_{12} appear to have produced results differing from the results obtained in the United States. By supplementing a vegetable feed mixture with vitamin B_{12}, a higher egg production of the pullets and an increased growth of the chickens were obtained, but substantially better effect was achieved, however, in both respects by using a mixture containing meat-and-bone meal and fish meal. In Denmark the latter feeds are available in comparatively ample quantities, but they are more expensive than soy bean oil meal. At present, the aim is not to use purely vegetable mixtures supplemented with B_{12}, but to determine to what extent it is possible to reduce the

A house at the Poultry Research Farm.

One of the houses at the Progeny Testing Station.

content of animal protein with no detrimental effects on egg production and growth.

On the other of the two experimental farms there is a Poultry Progeny Testing Station to which are sent, every year on October 1st, 128 groups of 10 pullets each from breeding centers all over the country, all daughters of the sire the progeny value of which is to be tested. At the station all groups are kept under quite uniform environmental conditions whilst conditions at the owners may differ rather considerably. The pullets are kept under control for 11 months upon which they are returned to their owners. Besides keeping records of the number of eggs and the weight of the eggs of the individual birds as well as of the feed consumption of each group, tests have also been made of late years of the quality of the egg shell and the quality of the egg white of the individual birds.

If the daughters of a sire have laid not less than 220 eggs of 57 grams during their first laying year, the sire may be entered in the Official Herd Book provided its body conformation is satisfactory, and certain other conditions are fulfilled.

GEESE AND GRASS

"Goosey, goosey, gander; whither dos't thou wander?" If goosey had replied that she and hundreds of others were going down to the cotton field to clean out the grass, we would have imagined ourselves in a modern Mother Goose rhyme for sure. But that is one of the modern developments on the cotton farm of Edward B. Frasier of Dos Palos, Calif., as it is told in the March 1953 issue of the Acco Press. Briefly, it takes three geese to the acre to keep down the grass. Mr. Frasier figures that a good goose does $5 worth of weeding a year, not to mention the value of edible goose flesh that is produced by this "low-cost" ration. (U.S.D.A. News Bulletin)

RESPIRATORY DISEASES OF POULTRY

STEPHEN GORDEUK, JR.
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Respiratory diseases of poultry have depressing effects on growth, rate of egg production, livability and market quality of eggs and poultry meat. Financial losses caused by reduced growth, decreased rate of efficient feed conversion into meat and eggs, and the reduced quality of poultry products are greater than the financial loss through mortality. The question is frequently asked: "How long will the infection remain on the premises?" That varies with the different diseases and the length of time some of the recovered birds are kept on the premises.

Baby chicks may contract infectious bronchitis and the mortality may be heavy. The financial loss at that time is not as severe because the chicks die before large feed costs are invested in them. At an older age, especially in broilers, slowing of growth occurs. In some cases peritonitis and testicular adhesions are encountered in broiler age chicks and more than the usual number of slips may follow caponization. When the birds reach the laying stage, the decrease in egg production and egg quality becomes the chief drawback.

RESULTS OF BRONCHITIS IN LAYERS

If bronchitis breaks out among laying birds it may permanently impair the laying abilities of many birds. Individual hens may lay fewer eggs, more eggs with meat and blood spots, and many misshapen and undersized eggs. The reduced egg production, misshapen eggs and poor quality eggs may be due to one or two factors.

1. The tissues in the ovaries and oviducts may suffer permanent functional impairment. If this is the case, there is little hope of reclaiming these flocks after apparent recovery.

2. The poor egg quality and reduced production may be due to improper hormone secretion after the birds are apparently well. If a hormonal factor is involved, it is possible that science may find synthetic hormones that can be given the birds. Then it may be possible for many recovered birds to be fully restored as profitable layers after they have had bronchitis.

Trapnests may be used to segregate the recovered birds that are laying normal eggs from those laying deformed eggs. The birds laying normal eggs can be kept for layers. Those

that do not lay normal eggs can be culled from the flock.

The current recommendation is to establish immunity before the pullets start laying. This is done by introducing the bronchitis virus into a flock when the pullets are 8 to about 17 weeks old. This, of course, applies to areas or premises where bronchitis is a definite threat, and not to localities that are free of the disease.

THE NEWCASTLE PROBLEM

Newcastle disease still occurs on Pennsylvania poultry farms despite the availability of various types of vaccines. It must be admitted, however, that the disease is fairly well under control and can be prevented by judicious vaccination and careful management. It is important to buy Newcastle vaccines from reputable concerns and bona fide sources. Improperly manufactured Newcastle vaccines have possibilities of contaminating the birds with other respiratory disease agents. Moreover, it is imperative to follow directions implicitly even when using certified vaccines. Improper vaccination is often caused by too much speed while vaccinating, and not getting enough vaccine into a bird.

At the present time there are variations in the potency of different Newcastle vaccines. Consequently, various reactions and different degrees of immunity may result. These variations could be largely eliminated by a standardization of Newcastle vaccines.

Newcastle disease is likely to occur in cycles of several years. When a wave of Newcastle has swept through a community most of the birds are immune and the chicks hatched from those birds may have more residual immunity. When Newcastle has not occurred in a community for several years most of the birds are susceptible and the chicks hatched from those birds have less immunity.

CHRONIC RESPIRATORY DISEASE

Chronic respiratory disease or air sac infection is another respiratory disease that is plaguing the poultry industry at the present time. It is believed that the same agent that causes this disease is also responsible for infectious sinusitis in turkeys. All ages, from young chicks to layers are susceptible to chronic respiratory disease. The period of infection for chronic respiratory disease is about twice as long or longer as that for infectious bronchitis.

Chronic respiratory disease can complicate bronchitis, bronchitis inoculation, Newcastle disease, and Newcastle vac-

cination. The respiratory symptoms of bronchitis should be gone in two or three weeks. If the condition persists beyond this period, there is a definite indication that another disease, namely chronic respiratory disease, may be present. Since this disease does not produce nervous symptoms, it can be distinguished from advanced cases of Newcastle disease. Moreover, chronic respiratory disease remains longer in the flock than does Newcastle disease.

CAREFUL DIAGNOSIS IS NECESSARY

There is no positive method of diagnosing chronic respiratory disease, especially when the first symptoms appear. Therefore, the elimination of Newcastle disease and infectious bronchitis is helpful to the diagnostician in establishing a tentative diagnosis of this disease.

In chickens affected with chronic respiratory disease the following symptoms may appear: nasal discharge, abnormal respiratory sounds, slow spread, persistence, coughing, sneezing, lowered feed consumption, loss in body weight, a decrease in egg production, and possibly reduced fertility and hatchability.

A postmortem examination of birds suffering from chronic respiratory disease may yield findings that are difficult to distinguish from those seen in Newcastle disease and in infectious bronchitis. In other cases an exudate may be found in the windpipe, the air sacs, heart sac, and other membranes. In later stages, a heavier accumulation of exudate may be found in the air sacs. A good flock history plus certain laboratory techniques are necessary in order to make an accurate diagnosis of chronic respiratory disease, or air sac infection.

Depopulation may be necessary to break the chain of this infection on broiler farms. An idle period of a month or more may be advisable to stamp out the infection from the premises. This is especially true where continuous broiler production is practiced.

ANTIBIOTICS ARE HELPFUL

There is experimental evidence that aureomycin, chloromycetin, streptomycin, and terramycin have a beneficial effect on birds suffering from chronic respiratory disease. In some cases aureomycin at the rate of 200 to 400 grams per ton has been given for one or two weeks at the first symptoms of disease with favorable results. More research work is needed relative to the treatment of this disease.

Respiratory infections in poultry may also be caused by infectious laryngotracheitis, coryza, aspergillosis, fowl pox and fowl cholera.

The infectious bronchitis and chronic respiratory disease viruses may be expected to stay on the premises as long as survivors of outbreaks are kept. Newcastle disease seems to lose its powers of transmissibility about a month after the occurrence of an outbreak. Depopulation of survivors is usually necessary to eliminate coryza and fowl cholera infections. Fowl pox and infectious laryngotracheitis are effectively prevented by vaccination. Aspergillosis must be basically controlled by removing contaminated litter. Contaminated dust particles in the houses and musty feed may be occasional causes of aspergillosis.

Management practices recommended when outbreaks occur are:

1. Supply sufficient heat. Sick birds may not eat enough to maintain normal body temperature (105-109° F.)
2. Do not excite birds.
3. Feed additional vitamin A feeding oil during period of reduced feed intake in order to maintain the health of the mucous membranes, glands, and kidneys.
4. Depopulate to break cycle of infection in diseases in which survivors remain as carriers.
5. Use vaccines and inoculations that are recommended for the particular diseases.

REMOVING AVIAN VOCAL CORDS

A short time ago, Dr. W. P. Blount, formerly with British Oil Cake Mills and now with Lederle Laboratories in England, wrote me enquiring if there was any record of the vocal cords of any fowl having been removed successfully. I replied that I was of the impression that the operation had been performed on a male chicken, but could not locate the reference. Shortly thereafter, Dr. Blount called my attention to an article by Dr. A. J. Durant, Missouri College of Agriculture, in the Journal of the American Veterinary Medical Association, volume 122, number 910, January, 1953. Dr. Durant removed the vocal cords of male and female chickens and young turkey toms, although Dr. Blount enquired concerning the possibility of removing the vocal cords of a peacock. The operation is rather difficult to perform and unless done properly may not be successful in bringing about permanent muteness.—Morley A. Jull, University of Maryland.

THREE CONVENIENCES EVERY POULTRY FARM SHOULD HAVE

L. F. PAYNE

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There are three simple practices which if adopted by farmers and poultrymen would save labor, reduce the number of dirty eggs gathered and control the spread of many common diseases on the farm. These practices are, (a) the installation of RUNNING WATER in the laying house, (b) adoption of the COMMUNITY NEST and, (c) installation of a DISPOSAL PIT on the farm.

It takes 30 minutes a day to supply water to the laying flock on the average farm. In some instances much longer. Where an elevated water tank or a pressure system is available RUNNING WATER can be provided in the poultry house at a nominal cost and when it is, labor for this chore is reduced almost to zero. The birds have fresh water all the time summer and winter—which is good for the birds and but little if any work for the caretaker.

A COMMUNITY NEST 2 feet wide by 10 feet long is large enough for 100 hens. It is simple to construct, easy to keep filled with litter, impossible for 2 hens to occupy the same nest at one time, hence the number of soiled and broken eggs is reduced to a minimum. The nest is built in sections so it can be removed quickly for the annual cleaning. The time required to gather the eggs from this type of nest is materially reduced under that necessary for the single type nest.

A DISPOSAL PIT is a hole in the ground about 7 feet deep and 5 feet in diameter. Hedge posts or other timber can be placed across the top with a 10 to 12 inch tile, flange end down resting over the center on two of the posts. About one foot of dirt is placed on top of the horizontal posts. A small tub fits over the top of the tile to exclude rats and mice and to confine most of the odor to the pit. It should be located some distance from the family water supply but convenient to the poultry house, and other out buildings.

Dead poultry, pigs, calves or other small animals can be dropped into such a pit soon after death, where they will eventually decay and return to the earth. This is a quick and easy way to dispose of dead animals. Stray dogs and cats can not drag them over the place and spread diseases which is possible when burial is in a shallow grave, or left on the frozen ground during the winter.

ASPERGILLOSIS

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Frederick, Maryland, U.S.A.

Aspergillosis (brooder pneumonia, mycotic pneumonia, pneumonmycosis), is a disease caused by any one of several species of the fungal genus Aspergillus. *A. fumigatus* is the principal one. The incidence of the disease is not great, but many species of birds are susceptible. Young birds of brooder age are most affected, probably due to more constant exposure by contact with contaminated litter rather than to age susceptibility. Turkeys and pigeons appear to be more susceptible than chickens to spontaneous infection. This disease is a frequent cause of death of exotic birds and especially of penguins in zoological gardens.

The disease is encountered in two forms. In young birds, acute outbreaks occur with a high morbidity and a high mortality. In penguins, the malady usually takes on the acute form. In older chickens and turkeys, sporadic cases usually occur, but occasionally when intensive exposure results from heavily contaminated feed or litter, the acute form may develop.

Since the disease in young chicks or poults may be confused with salmonellosis and especially pullorum disease and with acute respiratory ailments such as infectious bronchitis, they must be considered in making a differential diagnosis. The symptoms include dyspnea, gasping and accelerated breathing. Listlessness, lack of appetite, and emaciation are other symptoms. In an outbreak in wild turkey poults reared in captivity, described by Durant and Tucker (*Jour. Am. Vet. Med. Assn.*, 86: 781, 1935), the disease appeared at five days of age and reached a maximum mortality in 15 days. At the end of 21 days, 585 of the 700 poults had died. Hudson (*Poultry Sci.*, 26: 192, 1947) reported infection in the eyes in chicks two to five weeks of age. These chicks were exposed to contaminated bagasse (shredded sugar cane refuse), and the disease in them was characterized by the formation of a yellow caseous pellet beneath the nictitating membrane, with corneal ulceration in a few instances.

The lesions seen on necropsy depend on the site of infection. In acute cases, generalized infection of the respiratory tract, including the air sacs, is common. Pulmonary lesions vary from miliary to pea-sized yellowish nodules in the lung

tissue, or the lungs may be entirely hepatized. Often the air sacs will be filled with yellow semiliquid or caseated exudate with nodules or button-like ulcers attached to the mucous membranes. In the early stages, these ulcers appear as round, yellowish-white masses attached to the membrane. In advanced cases, a greenish mold turf may be seen over surfaces of the infected areas and in the convex depressions of the ulcers. Final diagnosis depends upon isolation and identification of the mold.

No satisfactory treatment has been found. Since the most common source of infection is contact with contaminated litter and less so with contaminated feed, careful selection of both feed and litter is essential. A search should be made to locate the source of the fungus causing outbreak, and whether litter or feed, it should be discarded. Liberal use of 0.5% copper sulfate solution as a fungicide will aid in eliminating the infection and in the prevention of further cases if the cause can be removed. (Veterinary Medicine)

OBSERVATIONS FROM TURKEY

In a recent publication, Dr. A. M. Pamukeu and Dr. H. Baskaya, of the Ankara University Veterinary Faculty, made the first observations in that country on an outbreak of visceral lymphomatosis and suggest that importations of eggs and chickens from countries where lymphomatosis exists should be stopped unless it might be possible to secure eggs or stock from flocks free from this disease.

The same authors and Dr. M. M. Mimioglu publish an account of a severe outbreak of coccidiosis among chicks at the Poultry Breeding Station of the Department of Agriculture at Ankara and among chicks of nearby farmers' flocks. Recommendations for controlling the disease are made.

In still another bulletin, Dr. H. Baskaya and Assistant H. Urman and M. Bese, submit suggestions for controlling aspergillosis in turkeys after a severe outbreak.

It is interesting to note the increased interest on the part of Turkish poultry authorities in problems facing the poultry industry of Turkey.—(Morley A. Jull, University of Maryland.)

A HIGHLY PRODUCTIVE HYBRID DUCK

A. HORN, V. GERENCSER and G. S. TOTH
University of Agriculture Godollo, Hungary

In the course of the experiments, the behavior of the hy- Peking type were investigated in respect to development, fat- brids of the muscovy duck and Hungarian White Ducks of the tening and liver production. It was established in course of the experiments that the growth of hybrids compared with that of the control group (Hungarian White Ducks of the Peking type) was higher by 11—17%. The difference of growth between hybrid and control groups is represented in the graph contained in the paper. (Table 1.) Hybrids fed willingly a larger amount of grass and other green fodder and during the fattening period, endured stuffing better and for a longer period than the control ducks. Fodder utilization of hybrids was approximately identical with that of the control group (Table 2.). Their fat production, however, was higher by 4.6%. Slaughter losses compared to live-weight were greatest in control ducks (Table 5.). Slaughter losses observed during slaughter tests, the development of fat production and liver size are compiled according to groups in Table 5. In course of the examination of the red blood cells of the parent species and hybrid ducks, the red blood cell number of the hybrids proved to be less than that of the parent species, whereas haemoglobin was 91.6% in hybrids and 75.6% in Hungarian ducks. (Table 4.). The weight of the liver of fattened hybrid ducks surpassed by 265—309% that of the control group (an average of 15.2 dk. resp. 46.8 dk). The quality of the liver compared to first-class goose liver was considerably more valuable in hybrid ducks (Table 6, water content 21.3% resp. 40.1% ; raw fat content 49.2% and 68.8% resp.) especially for canning purposes (liver pie), since a large quantity of intercellular fat gets into the raw material destined for canning. The marked tendency for the overdevelopment of the liver leads to the conclusion that liver size is extensively determined by heredity. If liver value produced from 1 kg of maize may be established as 100% in control ducks, then liver value produced from 1 kg of maize may be expressed in 465.97% in hybrid ducks, fattened for 3 weeks and in 451.1% in hybrids fattened for 4 weeks.

Thus the hybridization of the muscovy duck with Hungarian ducks may not only be regarded as an interesting experiment from a biological point of view or a remarkable

case of stock breeding, it also represents the classical manifestation of the cumulative effect of heterosis. The latter manifests itself not solely in increased vitality, better fattening ability, higher food utilization and unpretentiousness, and a better ratio of fat production but it is also expressed in the possibility of a relatively ensured production of first-class liver, as well as of a liver quality considerably more suitable for canning purposes than that of first-class goose liver.

The production of more valuable products does not lay increased claims as to quantity and quality of fodder.

POULTRY SCIENCE ASSOCIATION ANNUAL AWARDS

At the last annual meeting of the Poultry Science Association held at Vancouver, British Columbia, Canada, the customary presentation of five awards were made to members of the Association.

Dr. Herbert R. Bird, head of the poultry department of the University of Wisconsin, received the $1000 Borden award for outstanding research work in poultry nutrition carried on during the last seven years. Most of the research was carried on at the Agricultural Research Center at Beltsville, Maryland, since Dr. Bird just recently assumed his Wisconsin position. The Borden award is open to research workers in all fields.

Dr. Gerald F. Combs, nutrition specialist in the poultry department of the University of Maryland, received the $1000 American Feed Manufacturers Association award for his achievements in poultry nutrition research during the past two years.

Dr. Henry W. Garren, who recently received his Ph.D. degree from the poultry department of the University of Maryland, was presented the $100 Poultry Science Research award for the most outstanding research paper published during the preceding year. Dr. Garren is now on the poultry staff of the University of North Carolina.

Professor Thomas B. Avery, poultry department, Kansas State College, received the $100 Poultry Science Teaching award, and Professor J. M. Moore, poultry department, Michigan State College, received the $100 Poultry Science Association Extension award.

CAPONS VERSUS TURKEY BROILERS

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The turkey broiler is such an economical feed converter that it should afford the capon some competition provided there is sufficient public acceptance of the turkey broiler as a roasted bird. The big *if* in this statement is public acceptance.

The following table shows some *estimated cash* costs regarding these types of birds—assuming that they were marketed wholesale last November (1952) at a live weight of 7.5 lbs. Allowance is made for mortality in the feed conversion figure.

	Capon Barred-from sex link mating	Turkey broiler Beltsville	Turkey broiler W. Holland	Turkey broiler B.B. Bronze
Market age (wks.)	26	17	14	12
Feed conversion (lbs.)	5.3	3.9	3.2	3.0
Lbs. feed consumed	40	28	24	22½
Feed cost per cwt.	$5.30	$5.70	$5.70	$5.70
Farm price per lb.	.47	.39	.39	.39
Chick or poult cost	.06	.64	.82	.85
Caponizing or capetting	.07	.01	.01	.01
Feed	2.12	1.60	1.37	1.28
Brooding and litter	.04	.06	.06	.06
Total cash cost	$2.29	$2.31	$2.26	$2.20
Cash return	3.53	2.93	2.93	2.93
Net receipt per bird for labor and overhead	$1.24	$0.62	$0.67	$0.73

These estimates show that capons and turkey broilers can be produced at about the same unit cost because capons have been bringing a higher price on the wholesale market they are returning more money to the grower. It should be pointed out that the production period for the B.B. Bronze broiler is only half as long as that of a capon but it must also be remembered that there is more seasonal variation in wholesale turkey broiler prices than in capon prices. For example B.B. Bronze broilers being marketed wholesale in June 1952 (31¢ market) barely returned the cash cost of production with no return for labor or overhead. There will have to be marked changes in consumer preference before the capon bows out of the picture. This writer feels that already established turkey growers are the ones who can most efficiently produce and *market* the turkey broiler.

THE STATE POULTRY INSTITUTE OF HOLLAND

P. UBBELS

Rijksinstitut voor Pluimveeteelt, Beekbergen, Holland

The State Poultry Institute of Holland.

The State Poultry Institute of Holland is located at Beekbergen. A considerable amount of poultry research and related work is being carried on at the Institute. The purpose of this brief article is to acquaint members of the World's Poultry Science Association with the splendid work being done by the Institute staff.

Director: Ir P. Ubbels

Section I. General Affairs (including library and documentation)

Head: Ir H. M. K. Frings

Section II. Practical Research, Breeding, and Demonstration

Head' Ir H. M. K. Frings

Section III. Experimental Scientific Research

Head: Ir M. van Albada

ORGANIZATIONAL CONNECTION WITH THE MINISTRY OF AGRICULTURE AND WITH INDUSTRY

Together with the State Agricultural Experiment Stations at Hoorn and Maastricht, the Institute is under the

section Animal Production of the Directorate of Agriculture. The Director of Animal Production is chairman of the Advisory Board which has been created for the Institute and has to advise the Minister of Agriculture on the affairs of the Institute. The Board consists of a number of representatives of the industry, professors of the Universities of Utrecht and Wageningen and the Chief of the State Poultry Advisory Service. Among other things, the Board advises on the research-scheme to be drawn up for each year. At present the Board consists of: Ir Th. C. J. M. Rijssenbeek, The Hague, Chairman; J. Breukers, Roermond; Prof. Ir W. de Jong, Wageningen; Prof. Dr. G. M. v. d. Plank, Utrecht; A. H. van Steenbergen, Bennekom; Ir J. G. Tukker, De Bilt; E. de Vries, Leeuwarden; J. Wolfswinkel, Woudenberg; and Ir P. Ubbels, Beekbergen, Secretary.

ACTIVITIES

The Institute is almost exclusively occupied with research work with a view to promote efficiency in poultry-farming. In its present shape it is purely a Government institution. Its task has been defined by Royal Decree as "conducting practical and scientific research in the domain of poultry- and rabbit-farming and fur animal breeding, including treatment, preservation and first processing of products."

Information and instruction are not, as a rule, part of the Institute's activities. The results of the Institute's research appear in the publications of the Ministry of Agriculture. Apart from this they are published in scientific periodicals and in the professional journals. State advisory officers for poultry and others may use them for public information and instruction.

As exceptions to the above-mentioned activities of the Institute may be considered: the information given to visitors at demonstrations of housing-arrangements, equipment, animals, etc., which information must needs be of an instructive character; secondly, the fact that the director of the Institute is charged with the teaching of poultry-farming at the Agricultural University of Wageningen; and finally the manufacture of photographs and lantern-slides for use by the State advisory officers for poultry in their lectures and educational courses.

The total staff of the Institute, administrative and scientific included, amounts to about 50 persons.

PROVINCE OF RESEARCH

The experiments may cover the entire field of poultry-farming; an exception, however, has been made for the purely veterinary part, i.e. for the direct control of diseases, including tests and discovery of medicaments and vaccines. This branch of research is conducted elsewhere. (Of course, all other aspects of management likely to influence the poultry's state of health or to prevent diseases have the Institute's full attention. They come under the heading of housing-arrangement and management as well as nutrition and breeding).

The subjects for investigation may be divided into the following categories:

1. Housing and management;
2. Metabolism and nutrition;
3. Inheritance and breeding;
4. Embryonic development and hatching;
5. Quality of eggs and other poultry products.

EXPERIMENTAL FARM

For research work, the Institute has at its disposal an experimental farm, where, together with small quantities of ducks, geese, and rabbits, chiefly fowls are kept. The total of the stock amounts to about 2500 adult animals. In addition the proper amount of chickens is reared, mostly in spring and

summer, for the normal rejuvenation of stock. Moreover, for the sake of feeding experiments and in connection with other trials, chickens are hatched practically all the year round and kept for any length of time.

For grazing off the surplus grass in the yards and keeping their turf in good repair, a flock of sheep is kept.

The experimental farm with its houses, buildings, yards for the animals and some cultivated fields (chiefly used for growing green-feed for poultry and rabbits) covers around 30 acres. The rest of the property consists mainly of woodland and park. The poultry consume large quantities of feed (mash and grain). One of the buildings has been specially adapted to storing, cleaning, grinding and mixing this feed. Among other things, incubators (capacity: about 10,000 eggs per 3 weeks) have found a place in other buildings.

Comparative trials are being made regularly with laying stock as well as with young chickens, especially feeding experiments. Besides, the animals are subjected to experiments concerning heredity and breeding, in which particular attention is given to productive qualities, resistance to diseases, etc. Other experiments concern the hatching of eggs in incubators.

LABORATORY

The Institute has a laboratory specially fitted for physical, chemical, and microbiological research. Here feed samples are analyzed and the quality of eggs is tested. Besides, determinations can be made in connection with digestive trials, metabolic experiments and other physiological research.

LIBRARY AND DOCUMENTATION

The library contains the principal home- and foreign literature in our special province. Abstracts of the most important publications have been filed for reference. This documentation is made, except for use at the Institute, also on behalf of the State advisory officers for poultry, the Winterschools of Agriculture, etc., who monthly receive a stencilled survey of the abstracts. Contributions are made to the weekly publication: "Landbouw-documentatie" (Agricultural Documentation) of the Ministry of Agriculture.

INVESTIGATIONS OF THE LAST FEW YEARS

An enumeration of the most important subjects which have been brought under investigation at the Institute in the last few years is as follows:

The built-up litter system for layers and chicks.

Dull infrared emitters in chick rearing.

The value of vitamin B_{12} concentrates and of certain other products containing vitamin B_{12} and Animal Protein Factor for saving on the consumption of animal proteins in well-balanced food-rations as used in practical chick-raising in the Netherlands.

Antibiotics as a part of chick rations.

The caloric- and protein requirements of laying chickens.

The usefulness of A.I.V.-fish silage for layers.

Testing of vitamin-preparations of new commercial brands and determination of the vitamin D_3 content of samples of vitamin concentrates and cod-liver oil, both with chicks.

The utility of different kinds of roughage as feed for rabbits.

The heritability of hatchability in the fowl.

The inheritance of the down colour and a lethal abnormality of the beak, both in Barnevelders.

Comparison of the aptitude for fattening of rabbits from different breeds and varieties.

Influence on hatchability of the frequency of turning the eggs in incubators.

Measurements concerning the spreading of temperature in incubators and those concerning the influence of the height of the barometer on the operation of thermo-regulators.

Influence of storage conditions on the quality of market eggs.

The possible connection between internal egg quality and hatchability.

THAILAND GOVERNMENT OFFICIALS STUDY POULTRY SCIENCE IN AUSTRALIA

Two Government officials from Thailand, Messrs. Som Smerasuta and Suwan Kasetsuwan, are for a period of 8 months in Australia under a F.A.O. Fellowship. They will study poultry husbandry methods, incubation, artificial insemination and poultry breeding at the Commonwealth Scientific and Industrial Research Organization's, Poultry Research Center, Werribee, Victoria. They will complete their studies by spending a few months in the United States before returning to their duties in Thailand.—F. Skaller.

TREATMENT FOR BLUE COMB DISEASE IN CHICKENS

C. W. CROMLEY, D.V.M.
Ashville, Ohio, U.S.A.

Blue comb disease has been a problem to the poultry raisers in this territory. Magnesium sulfate and bowel antiseptics have not always accomplished the desired results. During the past season, terracon 25* was successfully used in the drinking water during several outbreaks. This product contains the equivalent of 25 gm. of terramycin hydrochloride activity per pound of material. Treatment prescribed has been the administration of one ounce of terracon 25 per ten gallons of water for four of five days. The following case reports are cited as typical examples of the use of this agent in the control of blue comb disease in farm flocks.

Case 1. Leghorn pullets (200 in flock). Several birds exhibited darkened combs, diarrhea, weakness, and anorexia. Two had died. Treatment was as follows:

One pound of magnesium sulfate per three gallons of water for five hours, followed by terracon 25 at the rate of 1 oz. per 10 gal. of drinking water. There was little or no improvement at the end of 24 hours. Treatment was continued, and at the end of 48 hours, the chickens were eating better. Two more birds died. The flock continued to improve, and treatment was stopped after the fifth day.

Case 2. White Rocks (300 in flock). Symptoms included darkened heads, diarrhea, weakness, and poor feed consumption. Terracon 25 was administered at the rate of 1 oz. per 10 gal. of water. At the end of 24 hours, no new cases had developed and the birds appeared to be brighter and more alert. After 48 hours, feed consumption was restored and the birds were more active. Only one bird was lost after the onset of treatment. Recovery was rapid since treatment was applied in the early stages.

Case 3. New Hampshire Reds (450 in flock). These birds consisted of two age groups; one of which was in about 30% production, the other only three months of age and non-productive. These chickens had been sick for four days. Eleven birds died the day before treatment was started. Succeeding losses were as follows:

Day of treatment	21
Day after treatment	10

* Chas. Pfizer & Co., Brooklyn, N.Y., U.S.A.

Second day	6
Third day	0
Fourth day	2
Fifth day	0
Sixth day	1

Many birds too severely affected to either eat or drink were treated individually by hand-dosing with the concentrated solution of the drug. Most of these birds were saved. Several surviving birds were destroyed after two weeks since they had become worthless culls. Without the use of terramycin most of this flock would have been lost as a consequence of the outbreak.

Case 4. New Hampshire Reds (250 in flock). One bird had a darkened comb and diarrhea, but the entire flock was going off feed. Terracon 25 was administered at the rate of 1 oz. per 10 gal. of water, while severely affected birds were hand-treated. Complete recovery followed without mortality or development of culls. The results in this flock illustrate the advantage of early treatment in outbreaks of blue comb disease before birds are badly off feed, and before severe tissue damage and weight losses have occurred.

SUMMARY

These cases are typical examples of the beneficial action of terramycin in the control of blue comb disease. The use of terracon 25 has been successful in the treatment of 54 affected flocks. It has produced quicker and better results than any other treatment used. If applied early and before severe damage has occurred, and while the birds will still drink, recovery is rapid with little or no mortality.

This agent has also been used prophylactically in the control of the disease. Appearing in one group of birds on premises where chickens were housed in separate buildings, the prompt administration of terracon 25 saved the unaffected group from an attack. Blue comb normally tends to spread rapidly from group to group. (Veterinary Medicine)

EGG QUALITY DECLINES AS LAYERS INCREASE IN AGE

Some very interesting observations on this problem have been reported by Robert H. Adolph, Farm Advisor, San Diego County, California, in Nulaid News, March 1953.

The eggs were obtained during April, May, and September from six Southern California commercial egg-producing plants, on each of which the laying pullets were housed according to age. On each of the six poultry plants, the eggs were gathered two or three times daily according to the age of the layers. On each poultry plant, for each age group, one case of large eggs was cooled previous to being packed in egg cases, all cracked and poorly formed eggs having been eliminated. On the poultry plants and at the processing plant, where the eggs were graded, the eggs were held under mechanical refrigeration at 50° to 60° F. from four to seven days after being produced.

All of the eggs were graded according to standards of quality established by the United States Department of Agriculture by one grader with several years' experience in government grading work.

Twenty-nine cases of eggs were graded. For each case, the results were recorded in terms of percentages of each of the following grades: AA, A, B, Checks, and eggs with blood clots and spots. The AA grading percentages were as follows:

Age of layers in months:	Under 12;	12-15;	15-18;	18-21;	21-24
Percentage grade AA	87.5	72.3	61.9	43.6	20.3

I believe that this is the first time that any observations have been made with respect to the grading quality of eggs in relation to age of layers.—Morley A. Jull, University of Maryland.

NEEDED, A STRONGER WORLD'S POULTRY SCIENCE ASSOCIATION

MORLEY A. JULL

University of Maryland, College Park, Md., U.S.A.

Through the World's Poultry Science Journal the World's Poultry Science Association is rendering a very valuable service to the poultry industries in many countries and more particularly in those countries with relatively large memberships in the Association. The numerous articles and the extensive references to the results of research carried on in various countries are of considerable value to producers and research workers.

At the same time, if the World's Poultry Science Association is to perform anything like its proper role as an international organization for the benefit of the poultry industry of

all countries, the membership must be increased considerably and the Journal must be improved in numerous ways in order that it may be of greater value to producers, breeders, and hatchery operators, to those who market poultry and poultry products, as well as to extension and research workers.

In fact, the Journal should be the "sounding board" for poultrymen everywhere to emphasize to all concerned the relative importance of the poultry industry as a branch of agriculture in all countries represented in the World's Poultry Science Association. This is particularly important in several countries in which agricultural leaders do not realize the comparative efficiency with which eggs and poultry meat can be produced in relation to other animal food products for better balanced diets for humans in practically all parts of the world.

From the standpoint of strengthening the World's Poultry Science Association, increased membership from numerous countries is vitally important. For instance, in relation to the number of poultry producers in England and the United States, English membership considerably exceeds that of the United States. Also, in the United States the poultry departments of several of the state colleges of agriculture are poorly represented. In spite of the relative importance of poultry production in France, this country has a meager representation in the W. P. S. Association. Also, practically all South American countries are very poorly represented, whereas there should be relatively good representation from such countries as Mexico, Argentina, and Brazil.

Then there are several other countries where the poultry industry shows promise of progressive development such as Egypt, Spain, and Turkey. Greatly increased memberships should be secured from these countries. And then there is Japan, Australia, and New Zealand that deserve consideration.

Up to the present, the World's Poultry Science Association has hardly "scratched the surface" with respect to the service that the Association should be rendering to the poultry industry of all countries. Many more members must be secured if the Association is to meet its obligations. Also, there must be a more complete review of the scientific literature in order to keep all poultry "leaders" abreast of progress accomplished with respect to problems involved in more efficient production and marketing of eggs and poultry meat. The World's Poultry Science Journal should be developed into the kind of a publication that will command the highest respect of agricultural leaders and poultrymen everywhere.

DISCOVERED IN TURKEY EGGS: PARTHENOGENESIS

Scientists at ARA's Beltsville research center have made the remarkable discovery that embryos can develop in unfertilized turkey eggs.

Dr. M. W. Olsen and S. J. Marsden of the Bureau of Animal Industry found retarded embryos and embryonic membranes in 15 percent of eggs laid by turkey hens 3 to 6 months after isolation from male birds. Further studies, still in progress, reveal embryonic tissue in eggs from Beltsville Small White hens that have been kept from all contact with mature male turkeys.

These are the first cases of advanced natural parthenogenesis—or spontaneous development of embryos without normal fertilization—ever reported in birds or other higher animals. Their discovery is important not only for poultry research and the turkey industry, but possibly also for research on cancer.

Natural parthenogenesis is common in the lower animals —bees and aphids, for example. Embryo development can also be induced artificially in some of these animals by chemical or mechanical means. When infertile frog eggs are pricked with a needle, some of them start development and a few will produce tadpoles.

But such tricks of nature were unknown in higher animals, and Olsen and Marsden considered carefully whether turkey males might, after all, have fathered the unusual embryos.

Females of some animals have produced fertile eggs long after mating. The queen bee reportedly can keep spermatozoa

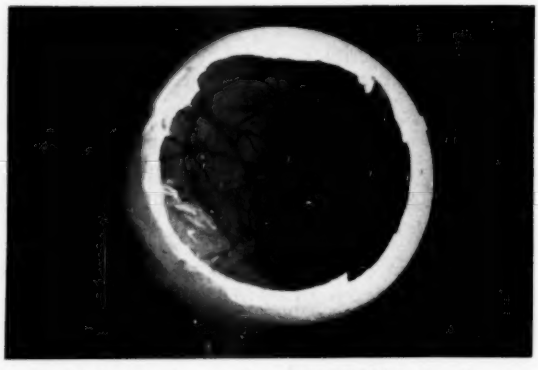

Fig. 1. Eight-day turkey embryo. NORMAL fertile egg, incubated for 8 days, has a well-developed system of blood vessels around embryo.

alive in her body for 7 years. Sperm cells live inside the female turkey much longer than in most birds, and poults have been hatched from turkey eggs laid 50 days after mating. An occasional fertile egg has been found 70 days after a single artificial insemination.

But some of the Beltsville hens far surpassed this record. Embryonic membranes developed in about 90 out of 600 eggs laid 100 to more than 200 days after the hens were removed from the males.

Furthermore, these hens had been segregated almost 2 months before they began laying. Their immaturity, plus the fact that turkey matings occur only by invitation of the female—usually just before or during the laying period—made it unlikely that the eggs had been fertilized.

To check their findings, however, Olsen and Marsden set up new tests, using hens that were isolated from other birds when 4-12 weeks old and never allowed contact with mature male turkeys. These studies, though not yet completed, show positively that some infertile turkey eggs develop embryonic tissue upon incubation.

The parthenogenic development is slow in starting and continues for only a few days. It is not visible to the candler until the eggs have incubated about 5 days. Embryos in normal fertilized eggs show up 18-24 hours after they are put in the incubator.

A few parthenogenic embryos develop almost normally. But these are rare. In most cases (98%), cell development is unorganized and produced simply a translucent membrane that spreads, cap-like, to cover part or all of the egg yolk.

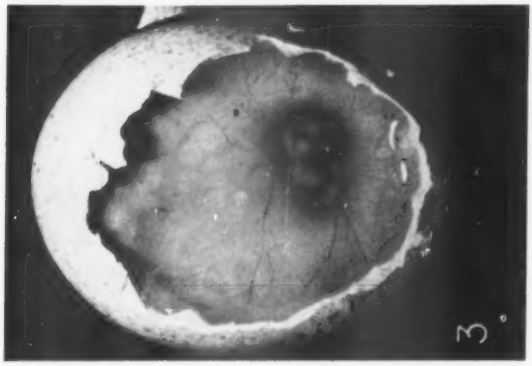

Fig 2. Six-day turkey embryo. RETARDED embryo, in egg laid 195 days after hen was isolated, took 11 days incubation to reach the size of a normal 6-day embryo.

This abnormal growth of tissue, where none should develop—and the puzzzling fact that something makes cell growth begin only after 3-4 day's incubation of the egg—gives Olsen's and Marsden's discovery its interest for cancer research.

What causes this strange development? The scientists don't yet know. But they believe it may be related to hormone imbalance in the hens that lay the eggs, possibly traceable to the pituitary gland. Not all turkey hens produce eggs of this type, but some lay many of them.

And what does this have to do with "the price of eggs"? Well, turkey eggs cost hatcherymen 25 cents or more each. Even so, a discouragingly large number of them won't produce young turkeys.

Parthenogenic cell tissue could account for some apparently fertile eggs that won't hatch out. Researchers now suspect that much old data on turkey-egg hatchability may be wrong. Many eggs that looked fertile when candled, but failed to hatch poults in past experiments, might not have been fertile at all.

Olsen's and Marsden's finding add up to the kind of basic discovery that calls for another look at past research—and points toward a clearer view of life processes in future. (Agricultural Research, August, 1953. Agr. Res. Adm. U. S. Dept. Agr.)

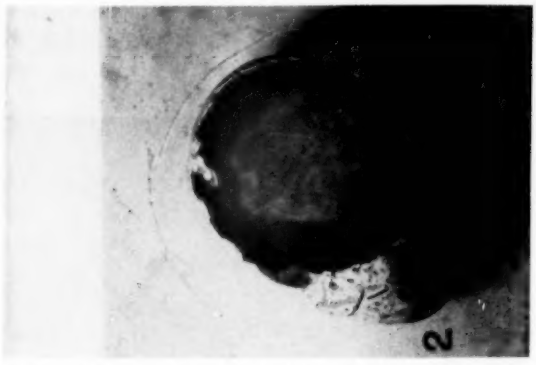

Fig. 3. Growth on yolk of infertile turkey egg. UNORGANIZED cell growth, without embryo formation, typifies most parthenogenesis in turkey eggs. This egg was incubated 7 days.

FEED CONSUMPTION OF MALE BREEDERS

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Quite recently a prominent hatchery operator asked me if I knew of any data on the number of pounds of feed consumed by cockerels kept in hatchery flocks. I told him that in so far as I know, there are no actual data on the amount of feed consumed by cockerels for any particular period, except during the growing period. As a matter of fact, it would be difficult to secure reliable data on the feed consumption of grown cockerels kept in groups of considerable numbers. The fighting would be excessive and the more timid birds would eat relatively little.

It is possible, however, to estimate fairly accurately the amount of feed that would be consumed by grown cockerels kept in hatchery flocks. Cockerels consume approximately the same amount of feed for any given period as nonlaying hens of the same size. For instance, it has been determined that a nonlaying hen weighing 5 pounds would consume about 65 pounds of feed in one year and a nonlaying 7-pound hen would consume about 81 pounds of feed in one year.

A hatchery-flock owner of a meat-producing strain of birds kept for the production of eggs to be hatched into broiler chicks is very much interested in the amount of feed consumed by the cockerels kept in the flock. If we assume that there are 1,000 females in the flock and that hatching eggs are required the year round, it is possible to estimate the amount of feed consumed by the cockerels kept in the flock. The ratio of females per male in the flock is assumed to be about 14 to 1 or 1,000 females to 70 males.

In many meat-producing strains of hatchery flocks, the average weight of the cockerels during the year would be about 7 pounds. They might weigh 6.5 pounds at the beginning of the hatching season and 7.5 pounds at the end of the hatching season. Cockerels weighing an average of 7 pounds for the year would each consume about 81 pounds. Therefore, 70 such males would consume about 5670 pounds or over 2.8 tons of feed in one year. If breeder mash costs $100.00 per ton, the value of the feed consumed by the cockerels would be about $280.00. If the hatchery flock consisted of 12 females per male, there would be approximately 83 males in the flock and they would eat about $336.00 worth of feed in one year.

EXPORT MARKETS FOR POULTRY*

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Imports and exports are not large factors in the poultry industry in the United States. Except for the years during which the United States exported dried eggs under Government programs, neither imports nor exports of either eggs or poultry meat have ever been as much as 2 percent of our national production. In most years, they were less than 1 percent.

In general, the scale of the domestic poultry industry is geared to the domestic market.

Before World War II, the outstanding feature of United States international trade in poultry and eggs was the import of large quantities of dried egg from China. This trade lapsed during the War, was restored to a larger-than-prewar scale in 1950, and was cut off in December 1950, after Korea, by freezing Red Chinese dollar balances in the United States.

During World War II, and thereafter until 1952, we exported significant quantities of dried egg. These exports were the result of Government purchases, first as a part of the war situation and then as a part of the defense aftermath. They were not commercial exports in the usual sense, and are not likely to recur except under unusual circumstances. In general, they are a part of the price support picture.

Even including the dried eggs, in the 1950's the United States imports and exports of eggs have been very small in the national picture. With dried egg included, 1952 exports were 1.1 percent of United States egg production, and imports were 0.1 of 1 percent.

For the last 10 years our largest source of imported shell eggs has been Canada. We in turn export some of our eggs to Canada, and some poultry meat. At least a small amount of trade in poultry and eggs occurs continually back and forth across the Canadian border. At times, when price relationships favor it, this trade becomes large enough to be an important factor in terminal markets located near the border.

When this trade with Canada expands for short periods to take adantage of temporary situations, the terms of trade for poultry meat seem most often to develop in favor of United

* Testimony presented to the Senate Committee on Agriculture and Forestry, May 7, 1953.

States exports to Canada, while the bulges in the egg trade are most often in the other direction. In the last year or so the Canadian dollar has been selling at more than 100 U.S. cents per dollar, and this has discouraged exports of eggs from that country to the United States, but has made Canada a more favorable place for the sale of United States poultry.

The most important current outlets abroad for shell eggs produced in the United States are Venezuela, Cuba, and Mexico, and to a lesser degree other Caribbean nations. Canada is a strong competitor in supplying these markets, and some European countries, notably the Netherlands, are also interested in those markets.

Egg and poultry production in western Europe has by now recovered from its wartime reverses, and the traditional European exporters of high-quality eggs, such as Denmark and the Netherlands, are now much better able to export than they were during the late 1940's. Three or four years ago the United States was exporting eggs to Switzerland, a highly unusual situation considering that country's location. But by 1951 the situation had turned so abruptly that not only was Swiss consumption being supplied from European sources, but at the same time the Netherlands was exporting shell eggs to the United States!

The 1951 Netherlands exports of eggs to the United States were accomplished under the benefits of a foreign exchange arrangement whereby the Dutch government permitted exporters to retain more of the dollars than was ordinarily the case. In that year the Netherlands exports to the United States would have been larger had more refrigerated shipping space been available for eggs.

The United States market, as well as the Caribbean, is of special interest to European suppliers because the Western Hemisphere is a hard-currency, dollar, area.

The area to which the United States exports poultry meat more or less corresponds to that to which we export eggs, but the trade is of relatively less importance from a national statistical viewpoint. There are difficulties in the way of increasing exports of poultry meat, as well as of poultry breeding stock.

The trade described here is naturally very important to those directly engaged in it or directly affected by it, but it may be well to repeat that as a part of the overall national picture it is not large, and that, in effect, the size of the poultry industry in the United States is geared to supplying dom-

estic demands.

It has been explained that commercial foreign trade of the United States in poultry products (live and dressed poultry, shell eggs and egg products) has never exceeded 2 percent of domestic production. If we consider the potential for importing or exporting in terms of the total volume produced and marketed in this country, it is doubtful that it will do so. The potential for expanding exports may be illustrated in more detail by reference to the experiences of the last few years in selling United States-produced poultry products in foreign countries.

Immediately after World War II, exports of poultry products, particularly to Europe, were relatively heavy, and consisted almost entirely of egg products. This was a result of several conditions. First, the poultry flocks of the war-ravaged countries of Europe were severely depleted; also, feed was short and imported grains were consumed by humans rather than by animals or poultry. Second, the United States was providing European Nations with dollar purchasing power, through the Mutual Security Agency and its predecessor agencies, which they could use to buy American food products. Third, the Commodity Credit Corporation of the U. S. Department of Agriculture was accumulating large stocks of dehydrated whole eggs through purchases made to support the farm price for shell eggs, under mandatory price support. These stocks were disposed of to needy countries under authority of Section 416, or were sold to these countries, principally England, at a negotiated price. The last sale made between the United States and England was consummated in July 1951, and consisted of a contract for 16.8 million pounds of dehydrated whole eggs.

Since that time, all remaining stocks of dried eggs from 1950 dried egg purchases have been sold for export only. The buyers, all American firms, are not finding a ready outlet in European countries, but must depend upon moving these products to Canada, Mexico, or South American countries, with very small outlets available in European markets.

Why has the export demand for this product changed in this relatively short period of years? The production of poultry products is easy to expand and contract. The countries of Europe have replenished their poultry flocks. By 1950, egg production in Europe, over-all, averaged about 8 percent above that from 1934 to 1938. Production increased in 1951 and 1952, with prospects of further increases in 1953. This building up of production, plus the continuing shortage of dollars.

limited the quantity of poultry products this country can find a market for in Europe.

For the most part, in recent years trading in poultry products in Europe has been between European countries on a bi-lateral basis. For example, the United Kingdom has had an import agreement with Denmark; Austria with Eastern European Countries; and Italy with Turkey and the Netherlands.

Before World War II, our exports of poultry products to Mexico, Cuba and Venezuela, were minor. But in 1952, over 90 percent of our total exports of shell eggs, and 65 percent of our exports of live and dressed poultry, were to these countries. Perhaps an important reason for the increase in exports is the trend toward industrialization of these countries lying to the south of us. Although these countries have been actively fostering native poultry production since World War II, and substantial progress has been made along this line, production continues to be inadequate to meet their expanded demand.

An example of the type of encouragement to production through Government action is the fact that the Government of Venezuela is extending credit to producers; also, early in 1951 it imposed an import duty of 20½ cents per pound on mature breeding stock at the insistence of native producers, even though this breeding stock was imported to strengthen the native stock; and later in the same year, all imports of frozen poultry were prohibited by that country. Efforts to control the spread of Newcastle disease in poultry were stated as the reason for this decision. Although exports to that country from the United States have been virtually cut off due to these controls, exports of baby chicks have continued. This will help to illustrate the point made earlier to the effect that little potential exists for expanding exports of poultry products from this country.

The situation in Mexico is somewhat different from that in Venezuela, but could end up the same; that is, by shutting off imports. Poultry consumption in Mexico has been increasing faster than production despite efforts by the Government of that country to encourage native production. Exports from this country to Mexico consist primarily of shell eggs, baby chicks, and dried eggs, the latter largely from Commodity Credit Corporation stocks purchased by CCC in 1950 and sold to exporters in 1952. Some dressed poultry is also exported to Mexico from this country. However resentment is apparently developing on the part of Mexican hatcherymen and pro-

ducers which could result in stopping these exports.

Our export trade to most other Central and South American countries is very limited. It is being restricted in a number of ways. Some of the countries are experiencing dollar exchange difficulties. All have been plagued by Newcastle disease and have imposed controls of various kinds, presumably to stop its spread.

The preceding points illustrate types of difficulties which can and may be encountered when considering the possibility of expanding exports of poultry products. As previously stated, production of poultry can be expanded or contracted relatively quickly. But the countries which offer potential outlets for poultry products produced in this country apparently wish to be self-sufficient in this respect. Imports into these countries are reduced or stopped by the imposition of licensing requirements, tariff barriers, health inspection requirements, or by other means.

The trade in poultry products between Canada and the United States is dependent upon relative price levels between the two countries, just as trade between different regions of the United States is influenced by relative price levels. With Canada, however, price differences must be great enough to cover the tariff charge in order for the product to move into, or out of, either country. In general, the United States exports more dressed poultry and dried eggs to Canada than it imports. The reverse is true of live poultry, shell eggs and frozen eggs. Occasionally, when Canadian products come into one of our border cities in substantial quantity, they become a source of annoyance to poultrymen in the immediate neighborhood of these cities. Naturally, the U. S. Department of Agriculture, and in many instances Congress, receive protests as a result of these conditions.

Before World War II, the United States received approximately 4 to 5 million pounds of dried egg yolk annually from China. When World War II came to an end, imports began to build up, and by 1950, before restrictions were imposed prohibiting imports of goods from Red China, imports of dried egg yolk were far above the levels preceding World War II.

There is considerable interest in the question: What effect might imports or exports of poultry products have on price support programs for these products? In 1950, when the Department was buying dried whole eggs as a means of supporting the producer price for shell eggs, imports of dried egg yolk from China were increasing. The Department pre-

pared briefs as a means of stopping these imports under authorities of Section 22, but the action taken to freeze Red China's dollar balances in the United States in December 1950 removed the necessity for such action.

These facts and figures support our view that foreign trade in poultry products has been of little domestic significance, as well as our view that it is not likely to become of domestic significance in the forseeable future.

BRONCHITIS VACCINE

The first infectious bronchitis vaccine licensed by the Bureau of Animal Industry, United States Department of Agriculture, is announced by Dr. Salsbury's Laboratories. It is an attenuated live-virus vaccine which produces a dependable immunity and is safe for healthy birds of all ages. It is not recommended, however, that chickens be vaccinated while in production.

Dr. Erwin L. Jungherr and Roy E. Luginbuhl, both of the Storrs (Conn.) Agricultural Experiment Station, succeeded in attenuating the infectious bronchitis virus by passage through chick embryos. This resulted in a vaccine which induces measurable bronchitis antibodies without causing undue mortality.

The vaccine has been used experimentally on over 20 million birds in extensive field trials. It has resulted in a marked difference in broilers, as vaccinated groups go to market earlier with greater weight, more favorable feed conversion, and less mortality than corresponding unvaccinated groups.

Infectious Bronchitis Vaccine has also been widely used experimentally to immunize replacement pullets. These are first vaccinated as young chicks, then revaccinated about 30 days before they start laying.

Day-old chicks may be vaccinated with Infectious Bronchitis Vaccine of the attenuated type. However, the recommendation is to delay vaccination, if possible, till chicks are 5 to 10 days old.

Vaccination is by the intranasal method. Dr. Salsbury's product is provided with a colored diluent, which makes vaccinating more convenient. It is also "Vaculized" to help retain maximum potency.

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne

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GENETICS

ABPLANALP, HANS, and I. L. KOSIN. (State Coll. Washington, Pullman.) GENETIC VARIATION OF FERTILITY AND HATCHABILITY IN THE BROAD BREASTED BRONZE TURKEY. *Poultry Sci. 32:* 321-331. 1953.—A study was made of the extent of the genetic variation in the fertility and hatchability performance of the 1950 and 1951 breeding birds of the Broad Breasted Bronze turkeys maintained at the Station. A more limited study was made of the heritability of "specific gravity" of hatching eggs. The data were based on 6-8 hatches each season, involving eggs saved 1-14 days prior to setting. For statistical analyses, eggs saved 1-7 and 8-14 days were treated as 2 distinct groups. In the main, the heritability estimates were based on (a) analysis of binomial variance and (b) analysis of variance among groups of full sister hens. When binomial analysis was the basis for estimating heritabilities of hatchability the h^2 values for eggs stored 8-14 days before setting were considerably higher than the corresponding values of eggs stored 1-7 days. The same held true when estimates were based on the transformed percentages. The values ranged between 0.03 and .45 for the 1-7 day group and 0.14 and 0.64 for the 8-14 day group. In the case of the h^2 values for fertility, the highest estimates were obtained from eggs stored 1-7 days. The heritability of specific gravity was close to .50. The results suggest that proper selection methods could improve hatchability in Broad Breasted Bronze turkeys.—*Auth. summ.* (Biological Abstracts)

CLARK, T. B.
SELECTING TURKEYS FOR THE BREEDING FLOCK. *Circ. West Virginia Agric. Expt. Sta. 86.* 3-14. Illus. 1952. (Biological Abstracts)

GODFREY, EDWARD F. (U. Tennessee, Knoxville.)
THE GENETIC CONTROL OF GROWTH AND ADULT BODY WEIGHT IN THE DOMESTIC FOWL. *Poultry Sci. 32:* 248-259. 1953. —Results based upon statistical analysis of body wt. and shank length data from 69 Rose Comb Black Bantams, 87 Barred Plymouth Rocks, and 2243 F_1, F_2, F_3 and B_1 crossbreds, indicated that the Bantams and the Plymouth Rocks differed by at least one sex-linked gene which affects growth rate, and thereby affects adult body size. The Bantams were recessive for this gene, and the contrasting alleles cause differences in body size of approx. 10%. Linkage studies suggested that this sex-linked gene is located approx. half-way between the silver and slow feathering loci on the sex chromosome. The fact that crossovers were probably detected between the slow feathering gene and the gene affecting body wt. indicated that the differences in growth rate and body size were due to a specific gene (or genes) and not to a pleiotropic effect of the genes at the silver or slow feathering loci.—*E. F. Godfrey.* (Biological Abstracts)

GRIESBACH, LEONARD. (Dominion Exptl. Sta., Fredericton, New Brunswick, Canada.)
THE GENETIC BASIS FOR LACK OF COLOR IN WHITE MU-

TANTS OF LIGHT SUSSEX POULTRY. *Poultry Sci. 32:* 367. 1953.—White mutants in some flocks of Light Sussex have been shown to have the genotype cc with regard to plumage color.—*L. Griesbach.* (Biological Abstracts)

HENDERSON, EARL W.
A SILVER-LACED CHICKEN WITH CORNISH ANCESTRY. *Michigan State Coll. Agric. Expt. Sta. Quart. Bull. 35:* 125-128. Illus. 1952.—Silver-laced autosexing "mutant" (black-laced white) progeny were obtained from a silver-pencilled cross-bred male mated to a red cross-bred female. The color pattern illustrated is quite similar to that of the Silver Laced Wyandotte. The pedigree of the mutants for 6 generations includes a predominance of Dark Cornish individuals, some Barred Rocks, White Leghorns and Rhode Island Reds, but no Wyandottes.—*E. W. Henderson.* (Biological Abstracts)

HENDERSON, E. W. (Michigan State College, East Lansing.)
INHERITANCE OF HATCHING POWER IN NINE GENERATIONS OF DARK CORNISH. *Amer. Egg and Poultry Rev. 14:* 18, 20, 33. 1952.—Selection of breeding stock after 1st generation was based primarily on egg production promise. From 1942 to 1947, Cornish pens of pullets were mated alternately with Cornish and Leghorn males in order to get approx. equal numbers of purebred and crossed chicks in each hatch. From 1948-1950, inclusive, pullets were mated with Cornish males. The avg. of fertile eggs hatched was 82%. The formula calculated for the regression line is $E = 2.16 X + 0.71$ or the rate of hatchability increased in succeeding generations at the rate of 2.16% per yr. —*H. G. Lindquist.* (Biological Abstracts)

HUTT, F. B. (Cornell U., Ithaca, N. Y.)
THE JANSEN KHAKI CAMPBELLS. *Jour. Heredity 43:* 277-281. Illus. 1952.—In the flock of about 50,000 Khaki Campbell ducks maintained by the Breeding Farm of Ducks Jansen, Limited, at Ermelo, Holland, avg. egg production in laying periods of 375 to 384 days is about 335-340 eggs per duck. For daughters of proven drakes the averages in 3 yrs. ranged from 359 to 365 eggs. These figures pertain to ducks surviving to 17 months of age, after only 7 to 9% were culled, and 1.3 to 2.8% had died. The eggs weigh 71 to 75 g., about 30% more than hens' eggs. Productivity and viability of this species and of this flock, when compared with that of well-bred chickens, is phenomenal. Methods of breeding are briefly described.—*F. B. Hutt.* (Biological Abstracts)

JEROME, FRED N. (Ontario Agric. Coll., Guelph, Canada.)
COLOR INHERITANCE IN GEESE AND ITS APPLICATION TO GOOSE BREEDING. *Poultry Sci. 32:* 159-165. Illus. 1953.—Progeny from a cross of White Chinese ganders and White Emden females furnished data to show that a sex-linked gene for dilution is carried by the White Emden female. The off-spring of this cross was colored when hatched and 2 down pattern types were present—a solid pattern and a spotted pattern. As adults some of this progeny became pure white. Data from this cross, supplemented by that from other crosses showed that the White Chinese was white because it was homozygous for the colorless gene (c). The White Emden, while it carried the gene for color (C), was white as an adult due to the action of the sex-linked gene for dilution on the spotted pattern. Data taken regarding the characters, neck stripe and white breast patch, showed that each is due to the action of dominant genes.—*F. N. Jerome.* (Biological Abstracts)

KRUEGER, WILLIE FREDERICK. (U. Missouri, Columbia.)
THE HERITABILITY OF TOTAL EGG PRODUCTION, ITS COMPONENTS AND BODY WEIGHT, AND THEIR GENETIC AND ENVIRONMENTAL RELATIONSHIPS, IN THE DOMESTIC FOWL. *170 p. Dissertation (Publ. 4274):* Univ. of Missouri, 1952. Microfilm available from Univ. Microfilms, Ann Arbor, Mich., Pr. $2.13; enlargements, 10c per page.—Complete production and body wt. measurements on 3389 birds (Leghorns, New Hampshires, Rhode Island Reds, and

White Rocks) produced from 1947 through 1950 were utilized. Both heritability and genetic correlations were estimated from the sire, dam, and within family components of variance and covariance obtained from the pooled analysis within breed and year, corrected for linear hatch effects. The traits investigated were sexual maturity, long pauses (7 or more days), short pauses, persistency, viability, an avg. of the 8-and 12-week wts., and housing wt. (20 or 22 weeks). Egg production was defined as 319 days minus days lost from lack of sexual maturity, long pauses, short pauses, lack of persistency, and mortality. Highly significant heritability estimates from twice the full-sib correlation were .28 for egg production, .20 for sexual maturity (X_1), .20 for long pauses (X_2), .16 for short pauses (X_3), .10 for persistency (X_4), .12 for viability (X_5), .46 for 10-weeks wt. (X_6), and .43 for housing wt. (X_7). Heritabilities from regression of progeny of dam were .17, .07, .23, .21, .33, and .32 for the above traits, omitting persistency and viability. Both additive and non-additive gene effects influenced total egg production, viability, 10-week wt., and housing wt. Sexual maturity was influenced partially by sex-linked genes, while avg. gene effects alone could explain the inheritance of long and short pauses. Genetic correlations of egg production with early maturity, fewer long pauses, fewer short pauses, persistency, and viability were .53, .59, –.59, .38, and .67, respectively, computed from sire and dam components of covariance. Corresponding environmental correlations were small except for viability (.76) and short pauses (–.69). Positive genetic correlations were obtained between sexual maturity and long pauses (.45), sexual maturity and persistency (.25), and fewer long pauses and persistency (.27). Fewer short pauses were correlated genetically with later maturity (–.46), more long pauses (–.39), less persistency (–.45), and poorer viability (–.53). Essentially no correlation existed for viability with sexual maturity, long pauses, or persistency. These correlations indicate that the components of egg production are not inherited independently. Genetic correlation of 10-week and housing wts. with egg production were small (.13 and .07, respectively), as were the environmental correlations (.00 and .09, respectively), Early sexual maturity and persistency appeared to be associated genetically with 10-week wt. (.39 and .26) and housing wt. (.29 and .16). No barrier to simultaneous improvement in early growth and egg production was indicated. The standard partial regression coeffs. indicated that net genetic merit for egg production was influenced importantly by viability (.81), long pauses (.55), short pauses (.50), sexual maturity (.42), and persistency (.22). The comparable association with net genetic merit for early growth and egg production was positive for 10-week wt. (.10), but slightly negative for housing wt. (–.05). The index giving optimum emphasis to components of egg production (signs reversed) was $I_1 = 61.3 + .50X_1 + .43X_2 + .55X_3 + .34X_4 + .32X_5$ with a heritability of 34.5%. When body wt. was included the index became $I_2 = 106.1 + .50X_1 + .44X_2 + .58X_3 + .36X_4 + .35X_5 + 8.05X_6 - 4.09X_7$ with a heritability of 32.4%. The corresponding heritability for total production was 28.5%, suggesting greater efficiency of selection for improved egg production from the index.—*Courtesy Dissertation Absts.*

LILLIE, ROBERT J., CHARLES W. KNOX, and H. R. BIRD. (U. S. Dept. Agric., Beltsville, Md.)

INHERITED VARIATION OF RESPONSE OF FEATHER PIGMENT TO VITAMIN D DEFICIENCY. *Poultry Sci. 32:* 65-69. 1953.—Studies were undertaken to determine the possibility of breeding to establish 2 lines of buff-feathered chickens, one line resistant to blackening in the absence of vit. D and the other line non-resistant. In a 3-yr. period when the progeny were fed a vit. D deficient diet, the incidence of blackening in the resistant line was decreased by breeding methods to 33.8%, whereas the incidence in the non-resistant line increased to 97.8%, both lines originating from the same stock. On the vit. D supplemental diet the incidence of blackening in a 1 yr. period was lowered from 1.7 to 0.0% and from 15.1 to 6.5% for the resistant and non-resistant lines, respectively. The data show that genetic and nutritional factors are interrelated in their effects on feather pigmentation.—*R. J. Lillie.* (Biological Abstracts)

MARAIS, C. L. (Potchefstroom).
THE BREEDING OF FOWLS FOR ECONOMIC CHARACTERS. *Farming in South Africa 28:* 325: 121-126. 1953.—The hereditary factors determining egg production are discussed as well as the value of progeny tests, trap-nest records, record keeping and practical advice on the selection of eggs for hatching.—*A. M. M. Gericke.*

OSBORNE, ROBERT. (Poultry Res. Centre, Edinburgh.)
THE INHERITANCE OF EGG WEIGHT IN THE DOMESTIC FOWL: FURTHER EVIDENCE OF SEX-LINKAGE. *Poultry Sci. 32:* 60-65. 1953.—Analysis of variance of mean egg wt. within a line, suggests, in each of 5 yrs., the primary dependence of individual variation on that of the male parent. Sampling effects, non-randomization of environmental factors and inbreeding do not appear to be responsible for the large sire components of variation. The effects are not reflected in the variation of mature body wt. Apparent dependence of female offspring on sire variation suggests that sex-linked inheritance may be operative. This is supported by multiple regression analysis of the phenotypic values of offspring, dams and sires, the latter being scored on their mothers' performance. The degree of detn. of offspring by paternal grandmother appears to be higher than by the dam, that by the maternal grandmother being negligible.—*Author.* (Biological Abstracts)

RUBIO PAREDES, DR. J. (Facultad de Veterinaria, Madrid, Spain.)
ENDOCRINOLGIA DE LA PUESTA DE LA GALLINA. *11 Congreso Internacional Veterinario De Zootecnia, Madrid, Spain,* October, 1951.—The object of the communication is to present a bibliographic revision of the hormonic mechanisms which regulate the laying of eggs of the birds and therewith to establish the scientific fundamentals permitting a research orientation and the correct actuation as to the economical, pathological, &c., aspects of the egg production of extraordinary zootechnical interest.

The communication is divided in three chapters corresponding to the ovulation, oviformation and oviposition in each of which there is made an investigation of the experimental actions of the hormones and of their lack.—*Dr. J. Rubio Paredes.*

PHYSIOLOGY

AKPINAR, AHMET C., and C. S. SHAFFNER. (U. Maryland, College Park.)
REPRODUCTIVE ABILITY OF CHICKENS IMPLANTED AT NINE WEEKS OF AGE WITH ESTROGEN PELLETS. *Poultry Sci. 32:* 119-122. 1953.—The effects of a single 15 mg. diethylstilbestrol pellet implanted into male and female chickens 63 days of age on their subsequent reproductive ability was studied. Changes in body wt. and comb size were recorded as well as egg production, egg size, and specific gravity of the eggs produced. The semen quantity and quality of the males was also recorded. The results indicated that the implantation had little permanent effect on the ultimate body size of either sex and that the ultimate comb size of the female was not affected while the combs of the treated males remained permanently smaller than those of the untreated males. The days to sexual maturity for the females were unchanged by the treatment, but the egg production, egg wt., and specific gravity of the eggs produced by the treated females were noticeably decreased. The date of sexual maturity of the males appeared to be increased and semen quantity decreased by the treatment; however, the treated males produced some semen of good quality. In general, it appeared that the treatment was much more noticeable on the males than on the females.—*Auth. summ.* (Biological Abstracts)

DEUCHAR, ELIZABETH M. (Genetics Res. Organ., Edinburgh.)
THE EFFECT OF A HIGH TEMPERATURE SHOCK ON EARLY MORPHOGENESIS IN THE CHICK EMBRYO. *Jour. Anat. 86:* 443-458. 1952.—Early chick embryos were exposed at 45.5 C. for 3 or 5 hr., then allowed to develop for 2-3 days at 37.5 C. Unincubated embryos were not affected. 20% of those treated at the 19 hr. stage were killed and 39.6% showed shortening, distortion or retarded development due to inhibited longitudinal extension of the axial tissues. 16 hr., 12 hr. and 7 hr. embryos showed higher percentages and more extreme types of abnormalities; these included distortion or defects in the nervous system due to accumulation of axial mesoderm at the node. In many individual embryos it was clear that the mesoderm region about to invaginate at the time of treatment had been affected. It is concluded that in the chick as in Amphibia, invagination can be arrested by a high temperature "shock," and that normal differentiation of the central nervous system requires normal invagination and extension of the mesoderm.—*E. M. Deuchar.* (Biological Abstracts)

HOFFMAN, EDMUND. (U. Georgia, Athens), **C. S. SCHAFFNER.** (U. Maryland, College Park), and **R. E. COMSTOCK.** (North Carolina State Coll., Raleigh.)
STRAIN COMPARISONS OF GLAND WEIGHTS OF TWELVE WEEK OLD BROILERS. *Poultry Sci. 32:* 106-110. 1953.—Existing phenotypic differences among strains and/or breeds of poultry are thought to be at least partly caused by differences in endocrine activity. Weight of a gland is not always an accurate criterion of its activity but a relationship between wt. and function is generally conceded. This study was conducted to determine if there are strain and/or sex differences in wts. of the endocrine glands and to what extent they can be explained by differences in body wt. Data were obtained on 16 male and 16 female chickens from each of 7 breeds or strains entered in the Georgia Broiler Test. Statistically significant strain and var. differences were obtained for all wts. and in only one case, comb wt. of females, did these differences become nonsignificant when adjusted for differences in body wt. However, adjustment for body wt. reduced strain differences considerably. The pituitary and adrenal glands of males were significantly heavier than those of females. The thyroid glands were not significantly heavier in males and, when adjusted for the wt. difference between the sexes, these glands were relatively heavier in the females.—*Authors.* (Biological Abstracts)

MARAIS, C. L. (Potchefstroom.)
IMPORTANT FACTORS IN THE HATCHING OF EGGS. *Farming in South Africa 27:* 317:394-398. 1952.—A comprehensive review is given of the factors influencing incubation. Types of incubators are discussed as well as sterilization of incubators, temperature, moisture, ventilation, testing of eggs and genetic factors.—*A. M. M. Gericke*

MARTIN, EDWIN P., AND CHARLES A. LEONE. (U. Kansas, Lawrence.)
SEROLOGICAL RELATIONSHIPS AMONG DOMESTIC FOWL AS SHOWN BY COMPARISONS OF PROTEIN PREPARATIONS FROM CORRESPONDING ORGAN SYSTEMS. *Trans. Kansas Acad. Sci. 55:* 439-444. 1952.—Using 6 protein prepns. from 4 domesticated fowls, chicken *(Gallus domesticus)*, turkey *(Meleagris gallopavo)*, goose *(Anser domesticus)* and duck *(Anas domesticus)* and the following antigens: serum, serum albumin, serum globulin, lens extract, gut extract and skeletal muscle extract, it was found that "the relationships shown by all the serological comparisons were in accord with those established by comparative morphological methods."—*F. C. Gates.* (Biological Abstracts)

MOSCONA, H., and A. MOSCONA. (U. Cambridge, Eng.)
THE DEVELOPMENT IN VITRO OF THE ANTERIOR LOBE OF THE EMBRYONIC CHICK PITUITARY. *Jour. Anat. 86:* 278-286. 1952.—Pituitary rudiments of 6-day chick embryos were cultivated in vitro by the watch glass technique and the histological and cytological

differentiation of the anterior lobe tissue was studied. The rudiments were grown either on a clot of adult fowl plasma and embryo extract or on a clot consisting of plasma and saline extract of acetone dessicated adult fowl heart tissue. The pituitary rudiments differentiated in vitro in an almost normal way. The formation of cell-cords and lobules in the anterior lobe took place during the first 4-days of cultivation and the typical basophil and acidophil cells differentiated after 6 days in culture. While both types of culture media proved satisfactory for the development of the explants, the cytological differentiation seemed more pronounced in cultures grown on media with the heart extract. The results provide an example of the capacity of an organ rudiment to pursue its development when explanted and cultivated in vitro. They also show, that such embryonic explants will differentiate in a culture medium derived entirely from the adult.—*Authors.* (Biological Abstracts)

MOSCONA, A., and H. MOSCONA. (Strangeways Res. Lab., Cambridge, Eng.)

THE DISSOCIATION AND AGGREGATION OF CELLS FROM ORGAN RUDIMENTS OF THE EARLY CHICK EMBRYO. *Jour. Anat. 86(3):* 287-301. 1952.—A study was made of the ability of partially and completely disintegrated limb-buds of 4-day chick embryos and of completely disintegrated mesonephroi of 3-day embryos, to reintegrate, to reestablish their typical histological patterns and to differentiate further in vitro. The chondrogenic blastema of the limb-bud, after partial disintegration by enzymatic digestion of the intercellular materials, differentiated in vitro into the typical skeletal parts. Discrete chondrogenic cells, obtained after complete disintegration of the chondrogenic blastema, reaggregated in liquid culture medium and the aggregates differentiated into normal cartilage. Aggregates formed in suspensions of mixed chondrogenic and myogenic cells, consisted of an inner core of cartilage cells and an outer sheath of myogenic cells and myoblasts. Discrete mesonephric cells in suspension formed aggregates which differentiated into typical tubular structures. It is concluded that discrete limb-bud and mesonephric cells of the early chick embryo are able to re-establish in vitro a tissue-like association and to resume their histiotypical development.—*Authors.* (Biological Abstracts)

MUNDAY, REUBEN A. (Tuskegee Inst., Alabama.)

THE POSITIONS IN THE SHELL AND WEIGHTS OF EIGHTEEN TO TWENTY-ONE-DAY CHICK EMBRYOS IN RELATION TO HATCHABILITY. *Poultry Sci. 32:* 202-207. 1953.—Eggs from Barred Plymouth Rock and White Leghorn breeds of domestic chickens were examined and positions of the embryos in the shell after 18, 19 and 20 days of incubation were noted. These embryos were also weighed and the relationships between position and hatchability and between embryonic wt. and hatchability were determined. Embryos were found in 5 positions. Position 1 (head forward down the median line with beak between the thighs) seemed normal for all chicks. They seem to change from Position 1 to Position 5 (head turned right with the beak under or over the right wing). Position 3 (head turned left with the beak under or over the left wing) was a comparatively poor hatching position, but not completely lethal. Chicks found in Position 2 (head in the small end of the egg) were unable to hatch. Embryos that assumed Position 4 (feet on top of the head) died in the shell. This position seemed to be related to egg size. Large eggs had a higher percentage of embryos developed with feet on top of the head.—*R. A. Munday.* (Biological Abstracts)

ROBINSON, D. S.

CHANGES IN THE PROTEIN COMPOSITION OF CHICK MUSCLE DURING DEVELOPMENT. *Biochem. Jour. 52:* 621-628. 1952.—A study was made of the quantitative changes occurring in the protein composition of the chick breast muscle as the tissue develops from the embryonic to the adult state. A standard method for the extraction and estimation of several protein fractions was developed. The sarcoplasmic proteins extracted from homogenized muscle tissue by dilute salt

solns. and the fibrillar proteins extracted in strong salt solns. but precipitated on dilution from 2 such fractions. That protein fraction insoluble in strong salt solns. but soluble in dilute alkali forms a 3d complex fraction and the final extracellular residue, a 4th. The changes found in the protein N content of each fraction during the development of the chick were presented with reference both to the fresh wt. of the tissue and the total protein. Protein analyses of the muscles of month-old and newly hatched chicks are contrasted with those of adult muscle from the rabbit.—*Auth. summ.* (Biological Abstracts)

ROBINSON, D. S. (U. Cambridge, Eng.)
CHANGES IN THE NUCLEOPROTEIN CONTENT OF CHICK MUSCLE DURING DEVELOPMENT. *Biochem. Jour. 52:* 628-633. Illus. 1952.—An assessment was made of the nucleoprotein content of certain protein fractions of chick breast muscle in the prehatching period. Nucleic acid analyses of these fractions and nucleic acid and protein analyses of isolated muscle nuclei were made. From these determinations the nucleoprotein content of the fraction which contains the proteins of the myofibril was calculated. A better measure of the changes in the myofibrillar protein content was obtained by correcting previous analyses for the nucleoprotein contribution. The large increase which occurs during embryonic development in the percentage of myofibrillar protein is thus made apparent. The low myofibrillar and high nuclear protein content of muscles which, nevertheless, respond to electrical stimulation was commented upon.—*Auth. summ.* (Biological Abstracts)

ROBINSON, D. S. (U. Cambridge, Eng.)
A STUDY OF THE ADENOSINETRIPHOSPHATASE ACTIVITY OF DEVELOPING CHICK MUSCLE. *Biochem. Jour. 52:* 633-638. 1952.—Muscle extracts containing the sarcoplasmic and myofibrillar proteins were prepared in 0.6 M KCl-borate soln, and the myofibrillar proteins precipitated on dilution to 0.05 M KCl. In the adult most of the muscle adenosinetriphosphatase is present in the precipitate in association with the protein, myosin. The adenosinetriphosphatase activity of the whole extract and of the precipitate was determined at different developmental stages. In the earliest embryos studied the percentage of the total activity in the sarcoplasmic fraction is high in comparison with that in the myofibrillar protein fraction alone. As development proceeds the distr. changes and the enzyme becomes more closely associated with the myofibril. The adenosinetriphosphatase activity of the sarcoplasmic fraction was studied in water extracts of embryonic muscle. Its relation to the adult myosin adenosinetriphosphatase and to that associated with the cell particulate systems of muscle was considered. The work cannot be related to previous studies on the protein distr. in chick muscle since the methods of prepn. of the fractions are different. Some possible interpretations of the results are discussed.—*Auth. summ.* (Biological Abstracts)

SHELLABARGER, C. J. (Indiana U., Bloomington.)
OBSERVATIONS ON THE PINEAL IN THE WHITE LEGHORN CAPON AND COCKEREL. *Poultry Sci. 32:* 189-197. 1953.—Hypertrophy of the testis of 40- to 65-day-old White Leghorn cockerels was noted when pinealectomy was performed at 2 days post-hatching. The testis wt. of pinealectomized chicks that received pineal injn. was comparable to the testis wt. of control chicks. This effect on testis wt. was reversed by admn. of pineal material to intact chicks. Hypertrophy of the pineal was noted in capons, but was less evident in capons that received injn. of pineal material. The gonadotropic potency of the anterior pituitary was increased in pinealectomized chicks. The reverse was found in intact chicks that received injn. of pineal material. *C. J. Shellabarger.* (Biological Abstracts)

SZEPSENWOL, J., and M. H. PARTRIDGE. (Emory U. Sch. Med., Atlanta, Ga.)
PHOSPHORUS CONTENT OF VARIOUS TISSUES OF CHICK EMBRYOS. *Amer. Jour. Physiol. 171:* 257-265. 1952.—Tissues of the

embryonic chick, from the 8th day of incubation until the time of hatching, were analyzed for total and acid-soluble phosphate by the sulfuric ashing method, and for acid-soluble phosphate and its fractions by differential hydrolysis. In the 6 tissues studied, brain, heart, liver, smooth muscle, chorio-allantoic membrane and skeletal muscle, the acid-soluble phosphate comprises 20-25% of the total phosphate. Three days before hatching, its concn. in skeletal muscle increases to 40% of the total phosphate. The changes in acid-soluble phosphate are due mainly to changes in the inorganic fraction. The organic labile phosphates show only slight variations; an increase in creatine phosphate is accompanied by a decrease in ATP and vice versa. The greatest change in acid-soluble phosphate, as well as in total phosphate, is seen in skeletal muscle, where the concentration doubles between the 10th and 19th days of incubation. This increase coincides with the transformation of spontaneously active embryonic muscle into adult muscle which contracts only in response to a stimulus. On the basis of this observation it is suggested that phosphate may participate in the development of a regulatory mechanism which prevents muscle from contracting spontaneously.—*Josef Szepsenwol.* (Biological Abstracts)

VAN SCHALKWYK, W. R., and C. R. LIEBENBERG. (Stellenbosch.)
THE BLACK AUSTRALORP, THE WHITE LEGHORN AND THEIR RECIPROCAL CROSSES. PART II. HATCHABILITY. *Farming in South Africa 27:* 317: 408-410. 1952.—The hatchability of approximately 1200 eggs from different matings was determined during the incubation period from June to August. The average percentage hatchability of 60.8 per cent was lowest in White Leghorns compared with 73.8 per cent for Australorps and 83.9 per cent for the Black Australorp x White Leghorn cross. In a further test approximately 750 eggs were grouped according to different weight grades. The results revealed that sex-linked genes are involved in hatchability and within the limits of 58 to 68 grammes, egg weight had no significant effect on the ultimate hatching result.—*A. M. M. Gericke.*

VAN SCHALKWYK, W. R., and C. R. LIEBENBERG. (Stellenbosch.)
THE BLACK AUSTRALORP, THE WHITE LEGHORN AND THEIR RECIPROCAL CROSSES. PART I. *Farming in South Africa 27:* 316: 363-364 and 374. 1952.—The statistical analysis revealed no significant variation in the fertility of eggs of the pure-breds—White Leghorn and Black Australorp and their reciprocal crosses. A total of 900 to 1000 eggs from each breed and cross was used in this investigation. In the purebreds the fertility varied from 21 to 26 per cent and in the crosses from 28 to 39 percent. In the Black Australorp x White Leghorn cross the fertility was higher than in the other matings. This difference was attributed to selective fertilization and the size of the Australorp male.—*A. M. M. Gericke.*

WHITE, ROGER F., and HERBERT L. EASTLICK. (State Coll., Washington, Pullman.)
THE DEVELOPMENT OF MELANOPHORES IN THE DOWN FEATHERS AND SKIN OF THE SILKIE FOWL. *Poultry Sci. 32:* 235-247. 1953.—The blue-black appearance of the skin and subcut. tissues of the Silkie fowl is due to large numbers of "sub-epidermal" melanophores which do not give up melanin to adjacent tissues. Such melanophores in Black and White Silkies are histologically identical and take no part in feather pigmentation. Apparently the epidermis of White Silkies is invaded by approx. the same number of potential feather-pigmenting melanophores as that of Black Silkie embryos, but the down of White Silkies fails to become heavily pigmented for a number of reasons. Among these are: lower vitality of the White Silkie melanophore, failure of the melanoblasts to multiply at a rate comparable to that in Black Silkie, failure of the feather-pigmenting melanophores to assume a position in the developing feather from which melanin is readily given up to feather elements. White Silkie feather-pigmenting melanophores which synthesize and transfer colored melanin particles to the down feathers generally lose this capacity before the time of hatch-

ing, and consequently the juvenile and adult plumages are usually pure white, although very infrequently a feather may be noted which contains a small spot or fleck of pigment. The melanin granules in Black Silkie feathers are stubby spindles, in White Silkie feathers the granules are rod-shaped while the sub-epidermal melanophores in both varieties produce biconcave, circular, disc-like particles.—*H. L. Eastlick.* (Biological Abstracts)

WILSON, P. N. (Wye College, U. London.)
GROWTH ANALYSIS OF THE DOMESTIC FOWL. I. EFFECT OF PLANE OF NUTRITION AND SEX ON LIVE-WEIGHTS AND EXTERNAL MEASUREMENTS. *Jour. Agric. Sci. 42:* 369-381. 1952.—Rhode Island Red x Light Sussex chickens were made to conform to 4 different growth curves by control of their plane of nutrition. The 2 sexes differ in their live-weights at equal age and in their bodily proportions both at similar ages and similar wts. The most marked sex-difference in external measurements is noted in the length of the mid-wing, and a possible functional explanation is advanced. In general the sex-difference is greatest for late-maturing characters.—*R. E. Burns.* (Biological Abstracts)

WOLFF, ETIENNE, and EMILIENNE WOLFF. (Lab. Embryol. Expt., Fec. des Sci., Strasbourg, France.)
CULTIVATION AND DIFFERENTIATION OF THE SYRINX OF THE DUCK EMBRYO CULTIVATED IN VITRO. *Poultry Sci. 32:* 348-351. Illus. 1953.—In vitro transplantation of the syrinx of the duck embryo into an anhormonal or hormonal milieu, removed before its sexual differentiation which normally occurs in the intact embryo at the 11th day of incubation, provides an excellent means of studying the differentiation and development of an organ (and its constituents) independent of the influence(s) which may be exerted upon it by other tissues. The experiments show that sex hormones have a direct effect on one of the most precocious of their target tissues—the syrinx—and that they are capable of producing sexual differentiation. Carried in olive oil droplets, moderate dosage of estradiol benzoate and large dosage of testosterone propionate cause female differentiation when placed in contact with the culturing syrinx. The latter effect may be regarded as an exception to the rather characteristic masculining ability of this androgen. Microphotographs of the developing syrinx are shown and its differentiation described relative to the experimental conditions imposed. The method is instructive for biologists, especially for those who are interested in contributing to developmental morphology or physiology.—*J. W. A. Brant.* (Biological Abstracts)

NUTRITION

ALMQUIST, H. J. (Grange Co., Modesto, Calif.)
AMINO ACID REQUIREMENTS OF CHICKENS AND TURKEYS. *Poultry Sci. 31:* 966-981. 1952.—Information published since 1947 on the specific amino acids requirements of chicks, poults and laying chickens is reviewed. The requirements as indicated at the present date are summarized in a table. Amino acid requirements increase as the protein level in the diet increases, and vice versa. Certain amino acid requirements expressed as a percentage of the dietary protein appear to decrease as the protein level increases. Amino acid requirements are influenced in some cases by size, age and variety of fowl. The general effect of antibiotics is not to decrease protein or amino acid requirements but possibly to permit more efficient utilization.—*Author.* (Biological Abstracts)

ANDERSON, G. W., J. D. CUNNINGHAM, and S. J. SLINGER. (Ontario Agric. Coll., Guelph, Ont.)
EFFECT OF AUREOMYCIN ON THE INTESTINAL FLORA OF CHICKENS FED DIETS VARYING IN PROTEIN CONTENT.

Canadian Jour. Comp. Med. and Vet. Sci. 17: 83-91. 1953.—The pH of cecal contents varied with the age of the birds with a pronounced decrease on all diets from 9-11 wks. In general, aureomycin resulted in a lower pH. It tended to increase cecal counts of most bacteria except on the highest protein ration (26%). Growth response to aureomycin tended to decrease as the protein content was raised from 17 to 26% and was least with 26% plus corn oil. The antibiotic resulted in reduced counts of enterococci. Whether or not alterations in cecal pH and microflora are responsible in any way for growth cannot be stated from present results.—*R. Gwatkin.* (Biological Abstracts)

BALLOUN, STANLEY L., and ELTON L. JOHNSON. (Iowa State Coll., Ames.)
ANTICOAGULANT PROPERTIES OF UNHEATED SOYBEAN MEAL IN CHICK DIETS. *Arch. Biochem. and Biophys. 42:* 355-359. 1953.—Blood-clotting time of chicks was significantly increased by feeding diets containing unheated, trichloroethylene-extracted soybean meal. Vit. K was not the limiting factor since clotting time was not reduced by the addition of this vit. to the diet. The anticoagulant was heat-labile because autoclaving completely abolished the anti-blood-clotting properties of the meal. Age and previous dietary treatment of chicks were not factors affecting the anticlotting action of unheated soybean meal.—*E. L. Johnson.* (Biological Abstracts)

BEARSE, GORDON E. (Western Washington Expt. Sta., Puyallup.)
GRANULATION, PELLETING, COLOR AND TEXTURE OF POULTRY FEEDS. *Feedstuffs 25(8):* 44-47. 1953.—Variations in color of ration due to the use of white or red wheat, or shifts from one to the other, caused no differences in egg production, but the poultryman is more color conscious than the hens. Consumers also prefer some color in the fat of the chickens and will accept quite a range of color in egg yolks. Processors prefer light colored yolks because of the effect of dark yolks in producing shadow in candling. The poultryman is more concerned about granulation than the chicken, but turkeys are more sensitive to particle size. Feed that is too fine results in longer feeding time to consume a given amt. of feed, certain ingredients may adhere to the beak, and the feed may be more wasteful. Feed ingredients should be ground moderately coarse rather than fine, but the importance of constant particle size has been overemphasized.—*H. L. Wilcke.* (Biological Abstracts)

BERNARD, R., and J. M. DEMERS. (U. Laval, Quebec, Canada.)
LE MANGANESE DANS LA NUTRITION DU CANETON (PEKIN BLANC). [MANGANESE IN THE NUTRITION OF THE DUCKLING.] *Rev. Canadienne Biol. 11:* 147-157. 1952.—When fed a diet deficient in Mn, ducklings exhibited the following symptoms: retardation in growth, decrease in the Mn content of the bones, lowered alkaline phosphatase activity of blood serum, typical perosis which appeared when the birds were 10-15 days old. A dietary content of 15 ppm. in Mn was sufficient to prevent perosis. However, about 60 ppm. was required to bring alkaline phosphatase activity of blood serum near normal values. The addition of Ca and P in excess to a diet already deficient in Mn, aggravated the symptoms of perosis and further depressed growth. Ducklings seemed to react similarly to chicks when fed a Mn-deficient diet.—*Auth. summ.* (Biological Abstracts)

BIRD, F. H. (Eastern States Farmers' Exchange, Rockville, Conn.)
THE LYSINE REQUIREMENT OF EIGHT-WEEK OLD CHICKENS. *Poultry Sci. 32:* 10-13. Illus. 1953.—The L-lysine requirement of 8-wks. old Rhode Island Red Chickens for opt. growth and efficiency of feed utilization was detd. A growth curve was developed by feeding groups of chickens a purified-type of basal ration supplemented with different levels of L-lysine monohydrochloride. The basal ration contained 16.43% protein. The L-lysine requirement in terms of the free amino acid was estimated from the growth curve to be 0.72% of the total ration. This was less than the requirement of the day-old chick by an amt.

equivalent to the reduction in protein requirement.—*F. H. Bird.* (Biological Abstracts)

BIRD, FRANCIS H. (Westbrook Lab., Rockville, Conn.)
A COMPARISON OF METHIONINE AND TWO OF ITS ANALOGUES IN THE NUTRITION OF THE CHICK. *Poultry Sci. 31:* 1095-1096. Illus. 1952.—Methionine (I) and 2 of its analogs, Dl-alpha-hydroxy-gamma-methylmercaptobutyramide (II) and Dl-alpha-hydroxy-gamma-methylmercaptobutyric acid salt (III), were fed to Rhode Island Red Chicks receiving a methionine-deficient ration. The ration was of the purified-type with peanut meal supplying the protein. In methionine equivalents the supplements supplied 0, 0.1, 0.2, 0.3 and 0.4% of the ration. The data indicate that the chick can utilize II and III for growth and improvement of feed efficiency. In general growth obtained from II and III paralleled that obtained from I.—*F. H. Bird.* (Biological Abstracts)

BLAKELY, R. M., R. W. ANDERSON, and H. I. MacGREGOR. (Dom. Expt. Sta., Swift Current, Sask., Canada.)
A COMPARISON OF CRUMBLED PELLETS AND MASH, WITH AND WITHOUT PROCAINE PENICILLIN, ON GROWTH OF TURKEY POULTS. *Sci. 32:* 677-679. 1952.—Five groups of 54 poults each were used to determine the effect on growth of the texture of a starter mash and of the addition of procaine penicillin at 4.41 ppm., before and after pelleting. Procaine penicillin resulted in a highly significant growth increase whether added to the mash or to the crumbled form of diet. The pelleting and crumbling process had no effect on the growth promoting activity of the procaine penicillin. Feeding the diet in crumbled (recrushed pellet) form had no significant effect on growth when neither diet contained penicillin. There was a significant increase in the body-weights of males fed the granular type diet when both diets contained penicillin. Leg weakness was not prevented by the addition of penicillin to the diet.—*Authors.* (Biological Abstracts)

BOLTON, W. (Poultry Res. Centre, Edinburgh.)
OBSERVATIONS ON THE VITAMIN METABOLISM OF THE COMMON FOWL. IV. FREE AND COMBINED RIBOFLAVIN IN THE MAGNUM AND LIVER OF THE LAYING HEN FED A DIET HIGH IN RIBOFLAVIN. *Jour. Agric. Sci. 43:* 120-122. 1953.—The partition of riboflavin into free vitamin, flavin-mononucleotide and flavin-adenine-dinucleotide was detd. The liver does not play any part in the day-to-day metabolism of riboflavin secretion in the albumen. The avg. amt. of free riboflavin in the magnum is 45% of the total. The amt. decreases as an egg passes through the organ. The decrease is equal to the amt. secreted in the albumen. It is suggested that riboflavin accumulates in the blood while an egg is in the magnum, and in the magnum between the passage of eggs.—*R. E. Burns.* (Biological Abstracts)

BOLTON, W. (Poultry Res. Centre, Edinburgh.)
OBSERVATIONS ON THE VITAMIN METABOLISM OF THE COMMON FOWL. III. THE EFFECTS OF OESTRADIOL DIPROPIONATE TESTOSTERONE PROPIONATE AND PROGESTERONE INJECTIONS IN IMMATURE PULLETS ON THE RIBOFLAVIN CONTENT OF THE MAGNUM. *Jour. Agric. Sci. 43:* 116-119. 1953.—Estradiol dipropionate evokes hypertrophy of the oviduct, and increases in serum Ca and serum riboflavin. Testosterone propionate evokes hypertrophy and reddening of the comb and wattles, and acts synergistically with estradiol dipropionate in evoking hypertrophy of the oviduct. Progesterone antagonizes the effects of the other 2 substances on the growth of the oviduct. Progesterone and/or testosterone propionate increase the percentage of free riboflavin in the hypertrophied magnum.—*R. E. Burns.* (Biological Abstracts)

BRANION, H.D., G. W. ANDERSON, and D. C. HILL. (Ontario Agric. Coll., Guelph.)
ANTIBIOTICS AND THE GROWTH OF DUCKS. *Poultry Sci. 32:*

335-347. 1953.—The feeding of aureomycin, penicillin and terramycin at levels of 10, 25 and 100 ppm. in the diet, and of streptomycin at 25 ppm. had no effect upon the growth of feed efficiency of young ducks to 6 weeks of age. Addition of the antibiotics to the diet at a level of 25 ppm. lowered the cecal pH, and modified the cecal microbial population, but the specific effect of the various antibiotics was not similar. A critical review of the postulated mechanisms by which antibiotics may stimulate growth in avian species is included.—*H. Branion.* (Biological Abstracts)

BRANION, H. D., and D. C. HILL. (Ontario Agric. College, Guelph, Canada.)
FISH MEAL AND THE RESPONSE OF CHICKS TO ANTIBIOTICS. *Poultry Sci 32:* 151-158. 1953.—Replacement of 6% meat meal with 6% fish meal in a starter diet gave better growth to 6 weeks. In view of the completeness of the meat meal diet in known nutritional factors it is suggested that the fish meal contributed an unknown growth factor or factors. Percent growth response to procaine penicillin was lower on the fish meal diet than on the meat meal diet.—*D. C. Hill.* (Biological Abstracts)

CARLSON, C. W., R. A. WILCOX, WM. KOHLMEYER, and D. G. JONES. (South Dakota Agric. Expt. Sta., Brookings.)
THE EFFECT OF PENICILLIN AND STREPTOMYCIN IN DIETS FOR BREEDING HENS. *Poultry Sci. 32:* 176-178. 1953.—Four expts. conducted under practical conditions with 60 W. P. Rock or N. Hampshire hens per treatment have shown, for the most part, that penicillin or streptomycin supplements in a mash-grain diet slightly improved egg production, feed efficiency, and hatchability of fertile eggs. Calculations indicate the control diet to have been adequate in known factors; however, it is possible that the antibiotics may have spared the requirement for a limiting or unknown nutrient since feeding was on a free-choice basis and the diet included meat scraps as the sole source of recognized unidentified factors.—*C. W. Carlson.* (Biological Abstracts)

COATES, M. S. (U. Reading, Eng.)
THE MODE OF ACTION OF ANTIBIOTICS. *Feed Age 2:* 36-37, 58. 1952.—Chicks at Greenford showed no growth gain from penicillin in the diet; those at Reading grew well only with penicillin. Greenford was raising chicks for the 1st time, while Reading had raised them for 10 yrs. Expts. showed that in a new lab., chicks grew better, even without penicillin. The depressing factor from the old lab. proved to be transmissible. The nature of this factor is a mystery, but it is responsible for what growers call "tired" or "chicken-sick" houses when they clear a house of chickens and "rest" it. This growth-depression is known not to occur in the bacteriologically sterile conditions of Reyniers (Notre Dame), a fact which would suggest, also, the action of some as yet undetected factor of microorganic nature.—*A. W. Hofer.* (Biological Abstracts)

COMBS, G. F. (U. Maryland, College Park.)
ARE YOU GETTING GOOD FEED EFFICIENCY? *World's Poultry Sci. Jour. 9:* 26-28. 1953.—Weekly growth and feed consumption averages are given for rapidly growing broilers. Four broiler rations containing terramycin or procaine penicillin used in one trial provided 10 week wts. from 2.97 to 3.11 lbs. From 2.72 to 2.84 lbs. of feed were required per lb. of gain.—*J. B. Christiansen.* (Biological Abstracts)

FROST, DOUGLAS V. (Abbott Lab., North Chicago.)
CONSIDERATIONS ON THE SAFETY OF ARSANILIC ACID FOR USE IN POULTRY FEEDS. *Poultry Sci. 32:* 217-227. 1953.—The tonic and growth stimulating effect of arsenicals excited the interest of investigators for nearly a century. Now recent work has spotlighted them, along with the antibiotics, as aids to improved nutrition. Arsanilic acid was well tolerated in chicks and turkeys at 5 times the recommended feeding level of 90 g./ton (0.01%). It was well tolerated in

weaned pigs at 180 g./ton (0.02%). There was no interference with egg production or hatchability in chickens at 0.02-0.03% of the diet. No interference in reproduction in rats was seen over several generations. Arsanilic acid, unlike certain other arsenicals, is well tolerated by ducks. There appears to be no danger to personnel in feed mixing operations when arsanilic acid is properly handled. No accumulation of As was found in the tissues of poultry fed arsanilic acid. The amt. of arsenic in chick muscle is less, even after many months of arsanilic acid feeding, than the amt. of As found in many natural foods. Fresh water fish and seafoods contain more As than is found in the tissues of poultry and hogs fed arsanilic acid. Thus, arsenic retained by animals during arsanilic acid feeding does not represent a hazard to the consumer. Return of As to the soil through droppings and fertilizer appears inconsequential in terms of amts. already there. A rapid chemical assay is available for direct control of the amt. of arsanilic acid added to feeds.—*D. V. Frost.* (Biological Abstracts)

GOFF, SIDNEY, WALTER C. RUSSESLL, and M. WIGHT TAYLOR. (Rutgers U., New Brunswick, N. J.)
HEMATOLOGY OF THE CHICK IN VITAMIN DEFICIENCIES. I. RIBOFLAVIN. *Poultry Sci. 32:* 54-60. Illus. 1953.—Hematological studies were made on chicks, starting at 2 days and continuing until 4 wks. of age on 125 μg. of riboflavin per 100 g. of ration. Another group received the same ration supplement to contain 325 μg./100 g. At 4 wks. the rations were reversed and continued to 13 wks. Erythrocyte counts were 1.8 x 10^6/cu. mm. at 2 days, increased steadily to 2.4 x 10^6 at 4 wks, again increased in the 9-13 wk. period to 3.0 x 10^6, but were not affected by the deficiency. Hemoglobin concn. was unaffected, but hematocrit increased. At 2 wks., prior to the appearance of deficiency signs, total leuckocytes were 34,000/cu. mm. in the control birds and 47,000 in the deficient, the increase being entirely in heterophils. Within 2 wks. after reversal of the rations the blood picture returned to normal. The control birds which received the deficient rations starting at 4 wks. failed to develop gross signs of the deficiency but did show some increase in heterophils and total leukocytes.—*M. W. Taylor.* (Biological Abstracts)

GRAU, C. R. (California U., Berkeley.)
ASPECTS OF PROTEIN NUTRITION. *Flour and Feed 53(6):* 12-13. 1952.—Summary of recent advances in our knowledge of protein and amino acid requirements for livestock (especially poultry) feeding. Protein concentrates such as fish meal and meat by-products show an enormous range of variation in quality. Reasons for such variations are so obscure that the materials can be evaluated only by actual feeding trials. There is urgent need for development of laboratory tests upon which protein quality standards can be reliably based.—*M. J. Blish.* (Biological Abstracts)

HARPER, J. A., and W. E. BABCOCK. (Oregon State Coll., Corvallis.)
THE EFFECT OF PENICILLIN ON EARLY MORTALITY AND GROWTH IN POULTS. *Poultry Sci. 32:* 179-180.—Procaine Penicillin in starter rations or as an aqueous suspension was used to determine the effect on early turkey poult mortality from non-specific causes and growth rate. Motality was markedly reduced and growth rate improved by the inclusion of the penicillin in starting rations. Penicillin given orally at the level of 200 μg. per poult was not as effective in reducing losses as including penicillin in feed.—*Authors.* (Biological Abstracts)

HEUSER, G. F., and M. L. SCOTT. (Cornell U., Ithaca, N. Y.)
STUDIES IN DUCK NUTRITION 5. BOWED LEGS IN DUCKS, A NUTRITIONAL DISORDER. *Poultry Sci. 32:* 137-143. 1953.—Expts. were conducted on the bowed leg disorder in ducklings. The ducklings were confined in pens with wire-mesh floors and were fed a basal diet composed of natural ingredients. The disorder was entirely prevented by supplementing the basal diet with 5 to 7.5% of dried brewers' yeast or by adding 10 mg. of synthetic niacin per pound of ration. Satisfactory growth was obtained with the addition of 3.8% of dried brewer's yeast

or 5 mg. of synthetic niacin per pound of ration. The niacin present in wheat standard middlings appeared to be relatively unavailable to the duckling as compared with synthetic niacin or to that present in dried brewers' yeast.—*L. C. Norris.* (Biological Abstracts)

HILL, C. H., R. BORCHERS, and C. W. ACKERSON. (U. Nebraska, Lincoln.)
INEFFECTIVENESS OF ARGININE IN OVERCOMING THE SOYBEAN GROWTH INHIBITOR IN THE CHICK. *Poultry Sci. 31:* 1098-1100. 1952.—A level of 10% unheated soybeans in a well balanced ration caused growth retardation of New Hampshire chicks. It was not possible to overcome this retardation by adding 0.3% arginine to the ration.—*Auth. summ.* (Biological Abstracts)

HILL, D. C., and H. D. BRANION. (Ontario Agric. Coll., Guelph, Canada.)
CHICK GROWTH STUDIES WITH DRIED CELLS OF A STRAIN OF SERATTIA MARACESCENS. *Poultry Sci. 32:* 367-368. 1953.—A prepn. of dried cells of a strain of *S. marcescens* was tested for vitamin B_{12} activity with chicks. Results correlated closely with an activity equivalent to 13.1 μg. of vitamin B_{12} per g. as measured with *Lactobacillus leichmanni* 4797.—*D. C. Hill.* (Biological Abstracts)

HILLERMAN, JOHN P., F. H. KRATZER, and WILBOR O. WILSON. (U California, Davis.)
FOOD PASSAGE THROUGH CHICKENS AND TURKEYS AND SOME REGULATING FACTORS. *Poultry Sci. 32:* 332-335. 1953.—The time required for food to pass through the alimentary tract was studied, using ferric oxide and charcoal as markers. Food passed through the alimentary canal of laying turkey hens in 3 hrs. and 13 min. and through non-layers in 4 hrs. and 16 min. Two hours and 27 min. were required for food passage through young turkey hens compared to 3 hrs. and 52 min. for old turkey hens. Thus age, as well as egg production, are important factors. Chicken hens and turkey hens were very similar in their feed passage rate. In chickens, laying and non-laying hens were about the same; 3 hrs. and 42 min., and 3 hrs. and 50 min., respectively. Penicillin in the feed slowed down the passage rate in turkeys and chickens slightly, since the antibiotic fed fowl averaged 3 hrs. and 15 min. while the fowl on normal mash averaged 2 hrs. and 57 min. Environmental temp. of 60° and 90°F. caused very little difference in the time of food passage.—*Authors.* (Biological Abstracts)

JUKES, THOMAS, H., and E. L. ROBERT STOKSTAD. (American Cyanamid Co., Pearl River, N. Y.)
FURTHER OBSERVATIONS ON THE UTILIZATION OF HOMOCYSTINE, CHOLINE AND RELATED COMPOUNDS BY CHICKS. *Jour. Nutrition 58:* 209-229. 1952.—A study was made of the responses of vit. B_{12}-deficient chicks to homocystine, betaine, choline, methionine, vit. B_{12} and folic acid as measured by early growth on diets which were deficient in several respects. A "factorial" design of adding the supplements enabled their interrelationships to be measured. The response to homocystine was markedly increased by vit. B_{12} under a variety of dietary conditions. However, in the absence of vit. B_{12} homocystine often actually depressed growth. The response to homocystine in the presence of added vit. B_{12} was increased by the addition of choline or betaine. However, when vit. B_{12} was not added, the response to homocystine plus choline or betaine added as a mixture was no greater than the sum of the responses to homocystine and choline or betaine when tested individually. Choline appeared to be highly effective as a "methylating" agent for homocystine in the presence of vit. B_{12} on a diet which was markedly deficient in methionine. There was no indication that the amino acids in the basal diet could effectively replace choline for this purpose. The incidence of perosis on a purified diet without added dimethylaminoethanol was high when vit. B_{12} was added and choline was omitted. The incidence was not reduced by adding betaine.—*Author.* (courtesy Wistar Bibl. Serv.)

KRATZER, F. H. (U. California, Berkeley.)
EFFICIENCY OF FEED UTILIZATION IN TURKEYS. *Feedstuffs 25(12):* 60-61. 1953.—Efficiency of feed utilization is dependent upon rate of growth and energy content of feed, and to a lesser extent, upon breeding, environment, diseases, and parasites. There is a relationship between other nutrient level and energy level because other factors may limit the utilization of energy when it is supplied beyond certain liimts. Corn is relatively high in energy. On the basis of energy, when corn is worth $3.00 per cwt., milo would be $2.86, wheat $2.73, barley $2.50, and oats $2.31 per cwt.—*H. L. Wilcke.* (Biological Abstracts)

KRATZER, F. H. (U. California, Davis.)
THE EFFECT OF VITAMIN B_{12} UPON THE UTILIZATION OF CHOLINE AND BETAINE BY THE YOUNG POULT. *Jour. Nutrition 48:* 201-207. 1952.—Poults hatched from hens deficient in vit. B_{12} were fed rations containing varying levels of choline or betaine in the presence and absence of added vit. B_{12}. Vit. B_{12} increased the effectiveness of choline in promoting growth but decreased its effectiveness in preventing perosis. Betaine caused only a slight growth increase on a low-choline ration and was ineffective in preventing perosis. Poults hatched from hens fed a normal ration showed little response to the addition of vit. B_{12} to their ration.—*Auth.* (courtesy Wistar Bibl. Serv.).

KAMSTRA, L. D., A. W. HALVERSON, and A. L. MOXON. (South Dakota State Coll., Brookings.)
EFFECT OF TRACE MINERALS AND OTHER DIETARY INGREDIENTS UPON CAROTENE STABILITY IN STORED POULTRY DIETS. *Poultry Sci. 32:* 352-356. 1953.—Carotene losses from alfalfa meal and carrot oil supplemented diets were determined following storage for 30 and 145 days at 3 different temps. Comparison of carotene losses in mixed vegetable diets in the absence and presence of meat scraps plus limestone and trace mineral ingredients showed that, when the above ingredients were absent, (a) carrot oil was superior to alfalfa meal as a carotene source in a simple corn-soybean diet, and (b) carrot oil carotene appeared more stable in a simple corn-soybean diet than in more complex diets. When meat scraps plus limestone were added to the diets, (c) losses of carrot oil carotene increased while alfalfa carotene showed little change. Further addition of trace minerals also caused (d) carrot oil carotene losses to increase slightly. Thus when diets contained all of the above ingredients, (e) carrot oil carotene losses exceeded alfalfa carotene losses to a slight extent.—*A. W. Halverson.* (Biological Abstracts)

LEWIS, R. W., and P. E. SANFORD. (Kansas State Coll., Manhnattan.)
USE OF EQUIVALENT LEVELS OF ANTIBIOTICS AND VITAMIN B_{12} SUPPLEMENTS WITH COTTONSEED AND SOYBEAN OIL MEALS IN CHICK DIETS. *Poultry Sci. 32:* 268-275.—An investigation was conducted to compare the growth responses promoted by supplementing cottonseed and soybean meal diets with equivalent levels of various commercial antibiotic and vit. B_{12} feeding supplements. The extent and conditions under which cottonseed meal can be used in practical chick diets was also studied. The antibiotic and vit. B_{12} feeding supplements used included Aurofac (aureomycin), Bacitracin 3-3 and Bi-Con 3+3 (terramycin). The supplements were adjusted and added at a level of 10 g of antibiotic and 6 mg. of vit. B_{12} per ton of feed. The soybean oil meal used was a 44% protein solvent extracted product. Both 41% hydraulic and 41% screw-pressed cottonseed meal were used. Chicks used were an egg production strain F_1 cross of New Hampshire x Kansas State College Strain White Plymouth Rocks, reared in wire-floored batteries. The addition of antibiotic and B_{12} feeding supplements at identical levels promoted superior growth with soybean meal as compared with cottonseed meal. A combination of the antibiotic-vit. B_{12} supplements, (Aurofac-Bacitracin 3-3) appeared to be more consistent in its growth promoting properties than any of the different antibiotics when added to cottonseed meal diets. Feed efficiency was observed to be more favor-

able when antibiotics and B_{12} were added to both basals. It was observed that the screw-pressed cottonseed meal promoted growth superior to that produced by the hydraulic type when both were supplemented with the Aurofac-Bacitracin combination. The incorporation of 12% soybean meal in the all-vegetable protein diet containing 20% screw-pressed meal, and a combination of Aurofac-Bacitracin apparently compensated for the lysine deficiency in cottonseed meal. Screw-pressed cottonseed meal included at a level of 15% in a practical diet adequately supplemented with a source of animal protein, soybean meal, antibiotics and vit. B_{12}, compared favorably to the Kansas State College high efficiency ration with respect to resulting growth rate of chicks.—*Authors.* (Biological Abstracts)

LIEBENBERG, C. R. (Stellenbosch.)
ALL MASH OR MASH AND GRAIN FOR CHICKS. *Farming in South Africa 28:* 323: 71-72. 1953.—White Leghorn day-old chicks bred from two-year old hens were divided at random into three groups of 22 each. Groups 1 and 2 were fed the same mash until 6 weeks of age after which group 2 received mash plus crushed yellow maize. Group 3 received mash plus grain from the commencement until the end of the experiment at 12 weeks of age. The results revealed that any one of these 3 methods of feeding is suitable. Maize had a retarding influence on feather development and induced feather picking.—*A. M. M. Gericke.* (Biological Abstracts)

LINDBLAD, G. S., S. J. SLINGER, G. W. ANDERSON, and I. MOTZOK. (Ontario Agric. Coll., Guelph, Canada.)
CALCIUM UTILIZATION BY CHICKS. *Flour and Feed 53(9):* 25. 1953.—The feeding of aureomycin appears to reduce the requirements for Ca and P in chicks.—*M. J. Blish.* (Biological Abstracts)

LINDGREN, N. O.
ANTIBIOTIKA SOM TILLVÄXTFAKTORER VID UPPFÖDNING AV FJÄKERFÄ. EN LITTERATURÖVERSIKT. [ANTIBIOTICS AS GROWTH FACTORS IN POULTRY. A REVIEW OF THE LITERATURE.] *Nordisk Veterinaermed. 5:* 245-252. 1953. (Biological Abstracts)

MacINTYRE, T. M., and M. H. JENKINS. (Dominion Exptl. Farm, Nappan, Nova Scotia.)
KELP MEAL IN THE RATION OF GROWING CHICKENS AND LAYING HENS. *Sci. Agric.* [Ottawa] *32:* 559-567. 1952.—Expts. were conducted to study the effects of feeding kelp meal, made from dried ground seaweed, to growing chickens and laying hens. 10% of kelp meal in the ration of laying hens caused very damp droppings but had no effect on mortality, egg production, hatchability, egg shell strength or body wt. Chickens will tolerate up to 10% of kelp meal in the ration, but no beneficial effects result from feeding kelp meal to growing chickens.—*T. M. MacIntyre.* (Biological Abstracts)

MacINTYRE, T. M., and M. H. JENKINS. (Dominion Exptl. Farm, Nappan, Nova Scotia.)
CLAM SHELLS, LIMESTONE AND OYSTER SHELLS AS SOURCES OF CALCIUM IN THE RATIONS OF LAYING HENS. *Sci. Agric. 32:* 645-650. 1952.—Clam shells, limestone and oyster shells were compared as sources of Ca for laying hens. There were 200 birds with 10 replications on each treatment. There was no difference in egg production, feed consumption or maintenance of body wt. between the lots fed the different sources of Ca or upon the addition of insoluble grit with oyster shells. Birds fed clam shells or oyster shells plus insoluble grit produced egg shells of superior quality to those fed oyster shells or limestone alone.—*Authors.* (Biological Abstracts)

McCLYMONT, G. L. (Nutrition Res. Lab., Glenfield, N. S. Wales), **and D. C. DUNCAN.** (Poultry Expt. Sta., Seven Hills, New S. Wales.)
STUDIES ON NUTRITION OF POULTRY III. TOXICITY OF

GRAIN SORGHUM FOR CHICKENS. *Australian Vet. Jour. 28:* 229-233. 1952.—A toxic factor in grain sorghum depresses growth up to 50% when rations contain 63% of such sorghums. Below 28% sorghum in rations there is no significant growth depression. The higher levels of sorghums increase mortality rate. Growth depression continued up to 26 weeks of age.—*P. R. Frey.* (Biological Abstracts)

MARIAKULANDAI, A., and JAMES McGINNIS. (State Coll., Washington, Pullman.)
THE VITAMIN B_{12} REQUIREMENTS FOR HATCHABILITY OF CHICKEN EGGS. *Poultry Sci. 32:* 3-7. 1953.—Two expts. were conducted to determine the effect of vitamin B_{12} on hatchability of eggs, livability of chicks and egg production of hens. Crystalline vitamin B_{12} injected at a 2 μg. level into eggs from vitamin B_{12}-deficient hens, significantly increased hatchability and viability of chicks. The quantitative dietary requirement of vitamin B_{12} for satisfactory hatchability was no more than 1 μg./kg. of diet. Contrary to previous findings at this laboratory and others 10 μg. or higher of vitamin B_{12}/kg. of diet increased the egg production over that of the birds receiving lower levels of this vitamin. The weight of mature birds was not affected by the vitamin B_{12} supplementation.—*Authors.* (Biological Abstracts)

MAYFIELD, O. J.
POULTRY AND ARSONIC COMPOUNDS IN DISEASE CONTROL. *Feed Age 2:* 35-36. 1952.—A comparison with turkeys for 18 days showed that an arsonic compound fed to 8 birds resulted in gains of 7.8 lbs. At the same time, of 8 control birds, 6 died of blackhead. With New Hampshire chicks (3/18/52-5/26/52) 48 birds received a dietary supplement of 0.005% of such a compound, while 50 received no medication in the feed. The former weighed 3.125 lbs. and consumed 7.335 lbs. of feed; the latter weighed 2.96 lbs. and ate 7.59 lbs. of feed.—*A. W. Hofer.* (Biological Abstracts)

MENGE, H., and G. F. COMBS. (U. Maryland, College Park.)
UNIDENTIFIED GROWTH FACTORS REQUIRED BY CHICKS AND POULTS. 2. FRACTIONATION OF A FACTOR IN LIVER. *Poultry Sci. 31:* 994-1004. Illus. 1952.—Using chick and poult assays involving purified and practical-type diets, a 350-fold concn. of an unidentified growth factor has been accomplished. This was prepd. by means of dialysis, precipitation of impurities with 80% ethanol, separation into the phenol layer of a phenol-water, 2-phase solubility system, followed by separation into the phenol-butanol layer of a 2-phase system composed of 25% phenol in n-butanol and water, and finally, by an 8-plate counter-current distr. using a phenol-butanol-water system. Two concentrates stimulated growth of chicks when only 4.8 and 6.4 mg. were supplied per 100 g. of diet. This unidentified growth factor is dialyzable and is soluble in water, phenol, and 80% ethanol, but insoluble in ether. Removal of the factor from a phenol soln. of the crude liver prepn. was accomplished through a continuous extraction with 95% ethonal. The activity of the factor was not destroyed by light, a temp. of 100°C. (wet) over extended periods, mild alkaline hydrolysis at pH 11.5, a pH range of 2.0 through 4.7, or drying in vacuo. A chick growth curve obtained from feeding the fractions prepared by counter-current distr. suggests the existence of either 2 forms of the same unidentified growth factor or 2 distinct factors, one of which is present in 2 forms with different solubility properties.—*G. F. Combs.* (Biological Abstracts)

MILLER, O. NEAL, J. W. GODDARD, ROBERT E. OLSON, and F. J. STARE. (Harvard Med. Sch. Boston.)
FOLIC ACID DEFICIENCY IN THE DUCK. *Jour. Nutrition 49:* 65-77. Illus. 1953.—Folic acid deficiency was produced in ducklings and is characterized by reduced growth rate, only slightly reduced food consumption, macrocytic anemia, enlarged liver, and a lowered titer of trypsin and amylase activity in the duodenal contents. The liver from the deficient bird is low in glycogen and slightly high in fat and in total N content. Blood glucose is normal. Under the exptl. conditions em-

ployed, no interrelationship was found between folic acid and vit. B_{12}. Histopathological examination of deficient tissue showed absence of the secretory cycle of zymogen granules in the pancreas, decreased alkaline phosphatase in the liver, and blurring of striation in the heart.—*Auth.* (courtesy Wistar Bibl. Serv.).

MILLER, M. WAYNE, and V. V. JOUKOVSKY.
AVAILABILITY OF PHOSPHORUS FROM VARIOUS PHOSPHATE MATERIALS FOR CHICKS. *Poultry Sci. 32:* 78-81. 1953.—Dicalcium phosphate, Curacao Island Phosphate, bone meal, colloidal phosphate, and defluorinated phosphate were compared by feeding them to chicks at 0.2% and 0.4% supplemental P levels. Ca was maintained at a 2:1 Ca/P ratio. Two lots of 20 chicks each were fed each ration. The bone ash and avg. wt. were detd, at the end of a 5-week feeding period. All P supplements tested were good sources of readily available inorganic P except colloidal phosphate which had less than 50% of the value of the others, based on the growth and % bone ash results. Bones of chicks fed the colloidal phosphate ration contained 24 times as much F as the bones of chicks fed bone meal.—*M. W. Miller.* (Biological Abstracts)

PATRICK, H. (U. Tennessee, Knoxville.)
THE EFFECTS OF HOMOCYSTINE, METHIONINE, VITAMIN B_{12} AND ANTIBIOTICS IN A METHIONINE DEFICIENT CHICK RATION. *Poultry Sci. 31:* 1075-1077. 1952.—New Hampshire chicks hatched from eggs laid by hens receiving a breeding ration containing animal protein were fed a vegetable protein ration containing uncooked ground soybeans. Supplements of methionine homocystine, vit. B_{12}, aureomycin, and penicillin increased the growth rate in chicks fed this ration, which is deficient in methionine. Aureomycin or penicillin plus methionine gave better supplementation than either of these antibiotics plus vit. B_{12}. Penicillin alone was better than aureomycin; however, when fed with methionine the growth response was similar. Methionine and homocystine were approx. equal in their growth promoting value when added to a methionine deficient ration fed to chicks which were not depleted in body storage of vit. B_{12}. The addition of either vit. B_{12}, penicillin or aureomycin to a methionine-deficient ration did not obviate the need for supplementary methionine.—*H. Patrick.* (Biological Abstracts)

PLANK, G. M. van der, and W. K. HIRSCHFELD.
GLOBAMINE ALS BRON VOOR ESSENTIËLE AMINOZUREN TOEGEVOEGD AAN MENG-VOER VOOR VARKENS EN KIPPEN. [GLOBAMINE AS AN ESSENTIAL AMINO-ACID ADDED TO MIXED FEED FOR PIGS AND FOWLS.] *Tijdschr. Diergeneesk. 77.* 701-710. 1952.—Whether to use globamine or not depends on the cost differential between it and animal protein.—*B. Büchli.* (Biological Abstracts)

RICHARDSON, LUTHER R., LYNN G. BLAYLOCK, and CARL W. LYMAN. (Texas A. and M. Coll., College, Station.)
INFLUENCE OF THE LEVEL OF VITAMINS IN THE DIET ON THE CONCENTRATION OF FREE AMINO ACIDS IN THE PLASMA OF CHICKS. *Jour. Nutrition 49:* 21-28. 1953.—The concns. of free arginine, lysine, methionine, tryptophan and valine in the plasma of chicks may be influenced by the amt. of pyridoxine, pantothenic acid, riboflavin, choline, niacin and vit. B_{12} in the diet. When the diet was adequate in all the vits., the concns. of lysine, methionine and valine were higher in the plasma of the group receiving the higher percentage of these amino acids in the diet. The concns. of arginine and tryptophan were higher in the plasma of the group receiving the soybean meal diet than in that of the group receiving a semisynthetic diet, even though the former contained a lower percentage of these amino acids. When the diet was low in a vit., the results were as follows: Low pyridoxin or pantothenic acid increased all of the amino acids except lysine; low riboflavin increased methionine, tryptophan and valine and

low niacin increased tryptophan. Low choline decreased arginine and lysine, and low vit. B_{12} decreased all of the amino acids. *Auth.* (courtesy Wistar Bibl. Serv.).

ROSENBERG, HANS R. (E. I. du Pont de Nemours and Co., Inc., New Brunswick, N. J.)
THE SITE AND NATURE OF PROVITAMIN D IN BIRDS. *Arch. Biochem. and Biophys. 42:* 7-11. 1953.—The sterol fractions were crystallized from the unsaponifiable materials isolated after alkaline hydrolysis of the extirpated preen glands of ducks, geese, and chickens. Spectroscopic examination of the sterols did not indicate the presence of any provit. D. The theory that birds obtain their vit. D through preening no longer can be supported. The distr. of provit. D in the body of chickens was also investigated. A relatively high concn., 0.4-4.0% was found in the sterols from chicken feet. Sterols isolated from goose feet contained 1.2% provit. D. The total amt. of provit. D in chicken feet ranged from 0.6 mg. in the feet of a 3-week old bird to 13.6 mg. in the feet of a 2-yr. old bird. Vit. D was prepared by u.-v. irradiation of the provit. D-containing unsaponifiable fraction from chicken feet. The ratio of efficacy for rats and chicks was approx. equal to the activity of vit. D_3. It is concluded that the natural provit. D of birds is either 7-dehydrocholesterol or a sterol of very similar structure.—*H. R. Rosenberg.* (Biological Abstracts)

ROSENBERG, M. M. (U. Hawaii, Honolulu.)
LOW-GRADE SUGAR, A POTENTIAL CARBOHYDRATE FEEDSTUFF FOR LAYING CHICKENS. *Poultry Sci. 32:* 69-77. 1953.—Low-grade sugar was fed for 20 weeks to laying pullets. In trial 1 it was fed at 32.25%, 45.5% and 56% of total ration in partial and complete substitution for cereal grains; in trial 2 it was fed as a 10:1 combination with bagasse pith at levels of 35.5%, 49.0% and 57.5%. In all rations protein level was kept relatively constant by changing the proportion of soybean meal or soybean meal plus sesame meal and tuna meal. At the highest levels of added sugar or sugar-bagasse mix, there was in general, in comparison with the control ration, a reduction in egg production, egg size, hatchability and economy of feed conversion. Rations containing sugar with soybean meal as the primary source of protein were superior, in all cases, in respect to egg production and feed conversion, to corresponding rations containing sesame meal and tuna meal along with soybean meal. It is suggested that low-grade sugar may have a place in layer rations, particularly under emergency conditions involving a scarcity in the supply of cereal grains.—*Author.* (Biological Abstracts)

ROSS, E., and H. YACOWITZ. (Ohio State U., Wooster.)
THE EFFECT OF PENICILLIN ON VITAMIN D REQUIREMENTS FOR GROWTH AND BONE CALCIFICATION [IN DOMESTIC FOWL.] *Poultry Sci. 31:* 933. 1952.—*An abstract.* (Biological Abstracts)

SCOTT, H. M. (Illinois Agric. Expt. Sta., Urbana.)
THE SIGNIFICANCE OF ALFALFA MEAL AS A SOURCE OF UNIDENTIFIED FACTORS REQUIRED FOR CHICK GROWTH. *Feedstuffs 25(13):* 54. 1953.—Suncured and dehydrated meals both produce growth response in chicks, which may be due to the same factor as the forage juice concentrate. It appears to be distinct from the liver or whey factors. When used with a purified diet, no growth depression resulted until the level of alfalfa exceeded 20%. This is somewhat in contrast to results obtained with practical rations. Therefore, there may be other substances in practical rations which contribute to the sum total of inhibitory factors. Chicks fed in batteries on corn-soybean meal type rations with no alfalfa exhibited severe subcut. hemorrhages with high death losses. This may be because of a low carryover of vitamin K.—*H. L. Wilcke.* (Biological Abstracts)

SHERWOOD, DONALD H. (U. Minnesota, St. Paul.)
STUDIES WITH CORN-SOY TYPE RATIONS FOR STARTING TURKEY POULTS. 71 p. *Dissertation (Publ. 4351): Univ. of Minnesota, 1952.* Microfilm available from Univ. Microfilms, Ann Arbor, Mich., Pr. $1.00; enlargements, 10c per page.—Broad Breasted Bronze poults were grown for 4 weeks on a basal ration (48% soybean oil meal and 45% ground yellow corn) fortified with Ca, P, Mn, and iodized salt, vitamins, A, B_{12}, D, riboflavin, and procaine penicillin. Additions of Ca pantathenate, niacin, inositol, thiamin, biotin and vitamin E to the basal ration failed to promote additional growth. Several expts. in which B_{12} was omitted from the basal ration, and added back in crystalline form, showed that poults require a dietary source of B_{12}, and that the requirement is between 5 and 10 μg./kg. of ration. Feed efficiency was not appreciably affected by B_{12}. Choline or betaine at a level of 0.1% and methionine at levels of 0.1% or 0.3%, improved the basal ration. The choline content of the basal ration seemed to vary considerably when made from different batches of soybean oil meal, and the choline in the ration apparently decreased in quantity or became less available on prolonged storage. When the ration was deficient in both choline and B_{12} the mortality was high, indicating that B_{12} had a partial sparing activity for choline. Addition of L-lyxoflavin at levels of 25 mg./kg. or more resulted in an increased growth rate, more pronounced with male birds than with birds of mixed sex. Addition of folic acid did not result in wt. increases which were significant at the 5% point, but in each of several expts. the trend seemed to favor the addition of folic acid to the ration of male turkeys. Poults kept on the corn-soy rations showed a high incidence of hock disorder, similar to that occurring in the field. With battery-raised poults the disorder manifested itself at 6-8 weeks of age. Adding choline (0.1%) to the ration, from 1 day of age greatly reduced the incidence, and addition of brewers' dried yeast at a 5% level decreased the incidence from 80% to about 10%. A curled-toe condition found in both the field and laboratory, in which the 3d digit is curled inward, was found to be associated with hock disorder. Rations that were effective in lowering the incidence of hock disorder also lowered the incidence of curled toe.—*Courtesy of Dissertation Absts.*

STERN, JOEL R., and JAMES McGINNIS. (State Coll., Washington, Pullman).
COMPARATIVE GROWTH RESPONSE OF CHICKS TO DETERGENTS, GERMICIDES AND PENICILLIN. *Poultry Sci. 32:* 26-28. 1953.—Various detergents and germicides were added to a chick basal diet at various levels. Either procaine or diamine penicillin was used as a positive control to obtain comparative effects of the supplements on growth. In every feeding trial, only penicillin produced a significant growth response. The detergents and germicides either produced no significant growth response or, in some cases when fed at high levels, depressed growth.—*Authors.* (Biological Abstracts)

THOMPSON, C. R., and W. D. MacLAY. (U. S. Dept. Agric., Albany, Calif.)
XANTHOPHYLLS. *Feed Age 2:* 22-25, 38. 1952.—Since chickens especially the yellow-skinned breeds, depend upon the absorption of xanthophylls in the feed to impart a yellow color to the shanks, beaks, fat and skin, and to the uniformity of dark yolks that command premium prices, a study was made of pigments in feed. Samples of alfalfa meal were obtained from several different dehydrators. The initial xanthophyll and carotene contents were established; the samples were stored at 77°F. for 16 wks. Xanthophyll was retained 9-30% better than carotene. In sun-cured meal, the ratio of xanthophyll to carotene was much higher than in dehydrated meal, but storage losses were similar. Much more carotene than xanthophyll was lost during sun-curing. Both alfalfa and vegetable leaf meals are rich sources of xanthophylls.—*A. W. Hofer.* (Biological Abstracts)

WILLIMON, CHARLES P., and C. L. MORGAN. (S. Carolina Agric. Expt. Sta., Clemson.)
THE EFFECT OF MINOR NUTRIENT MINERAL ELEMENTS

IN THE DIET OF CHICKENS ON FEATHER PULLING AND CANNIBALISM. *Poultry Sci. 32:* 309-313. 1953.—Studies on the addition of Al, Ba, Cr, Cu, Pb, Mo, Ni, Ag, Sn, Ti, Zn, and Zr to standard starting growing and laying rations of chickens from day-old to 44 weeks of age did not show any consistent effect upon feather pulling and cannibalism. The compounds furnishing these elements were added in groups of four and in entirety to the rations fed in relation to the amts. of these elements found in feather ash as detd. by spectographic analysis.—*C. L. Morgan.* (Biological Abstracts)

PATHOLOGY

ANDERSON, R. W., R. M. BLAKELY, and H. L. MacGREGOR. (Dom. Expt. Sta., Swift Current, Sask., Canada.)

THE TOXICITY OF ALDRIN FOR GROWING TURKEYS. *Sci. Agric.* [*Ottawa*] *32:* 586-591. 1952.—In 3 expts. the insecticide aldrin was added to the diets of growing turkeys at 1.5 ppm. to 1000 ppm., technical aldrin. Levels of 100 ppm. or more in the diet caused the feed to be quite unpalatable. All levels above 25 ppm. were highly toxic. Avg. survival time was 4.2 days for 1000 ppm. and 8.2 days for 25 ppm. A level of 12.5 ppm. caused mortality of 3 birds out of 20 in a 42-day feeding period. All technical aldrin levels above 3 ppm. caused a significant depression in growth rate for both males and females. A level of 3 ppm. caused a significant growth depression for males only. Birds which had previously received 12.5 ppm. of technical aldrin in the diet for a 42-day period suffered extremely high mortality when returned to an aldrin-free diet on range, under adverse weather conditions; the control birds and those which had received lower levels of aldrin suffered no mortality under similar conditions. Toxicity symptoms and post-mortem findings are outlined.—*Authors.* (Biological Abstracts)

BRACKETT, STERLING.

COCCIDIOSIS PREVENTION FOR EGG PRODUCERS. *Feedstuffs 25(14):* 30-35. 1953.—Chickens acquire immunity to coccidiosis through repeated light infections. Continuous feeding of anticoccidial drugs at the levels recommended by the manufacturer retards the development of coccidial infection and thus permits the development of immunity in the growing chick. Exceptional weather conditions may favor coccidial development to such an extent that outbreaks will occur even when anticoccidial drugs are used at low levels, or conversely, may be so unfavorable that there is insufficient coccidial infection to permit the development of immunity. There are a number of species of coccidia which attack chickens with varying degrees of severity. Medicated feeds do not prevent the development of immunity to the various spp., but may cause some variation in the length of time required to develop some immunity in the host, depending upon their relative effectiveness against the several species of coccidia.—*H. L. Wilcke.* (Biological Abstracts)

BRAGG, DENVER DAYTON. (Virginia Polytech. Inst, Blacksburg.)

AN ATTEMPT TO DETERMINE THE CAUSE OF CURLED OR DEFORMED TONGUE IN YOUNG BELTSVILLE TURKEYS. *Poultry Sci. 32:* 294-303. Illus. 1953.—A low incidence of the curled tongue abnormality exists among Beltsville White poults at hatching time. The incidence of curled tongue was greater among poults fed fine mash than among those fed a coarse mash or chick-sized pellets. Giving supplements of leucine, isoleucine, and phenylalanine to affected poults fed apparently adequate rations failed to speed up recovery. Small quantities of terramycin and bacitracin as used in the rations of this expt. failed to prevent the occurrence of this deformity. Feeding poults pellets or the coarser type mashes to 7 weeks of age produced greater body wt. and greater gain per unit of feed consumed than did the finer mashes.—*D. D. Bragg.* (Biological Abstracts)

EL DARDIRY, AHMED H. (Fouad U., Cairo, Egypt), **NELSON F. WATERS, and GEORGE E. COTTRAL.** (U. S. Reg. Poul. Res. Lab., East Lansing, Mich.)

THE RESPONSE OF INBRED LINES OF CHICKENS TO LYMPHOID TUMOR TRANSPLANTS. *Poultry Sci. 31:* 523-534. 1952.—Chickens were inoculated in the pectoral muscle at 21 days of age with a standard inoculum prepared from non-filtered lymphoid tumor material from RPL strain 16. The chickens of the various inbred lines showed marked differences in mortality following inoculation. Death occurred, however, only after the visceral organs became involved. When the composite data were analyzed on a family basis, there was no indication that resistance or susceptibility to tumor transplants measured resistance or susceptibility to naturally occurring lymphomatosis.—*N. F. Waters.* (Biological Abstracts)

KOUTZ, FLEETWOOD R. (Ohio State U., Columbus.)

THE EFFECT OF BUILT-UP LITTER ON THE PARASITE OVA AND OOCYSTS OF POULTRY. Second report. *Poultry Sci. 32:* 313-320. 1953.—These expts. were conducted over a period of a year starting in June and ending in May. Three expts. of 12 weeks each were conducted. Between the 1st and 2d expt. 2 weeks elapsed; between the 2d and 3d, 10 weeks elapsed. Parasite ova of *Ascaridia galli, Heterakis gallinae,* and *Capillaria retusa* in the built-up litter were not destroyed as shown by the presence of the adult parasites in chickens reared on the litter. The oocysts of *Eimeria acervulina, E. maxima,* and *E. tenella* in the built-up litter were viable as shown by the presence of these coccidia and the lesions of coccidiosis in the chickens reared on the litter. Records of the temp. of the building, the built-up litter and the outside temp. was taken during the expts. In the 3d expt. the litter lay idle for 10 weeks during the coldest part of the winter. Temps. were taken as low as −14°F. on several days. Rearing young chicks on the same litter that old hens have used can constitute a very grave parasite problem. Hens that have parasites are constantly contaminating the litter with ova and oocysts so that the baby chicks placed on this hen litter are very susceptible to both nematode parasites and coccidia. The old built-up litter on which only young birds have been reared did not seem to present as great a problem as far as nematode parasites were concerned, but coccidiosis still presented a problem. It is well to assume that if chickens are reared on the litter for twelve weeks without older parasitized hens having been on the litter then the nematode problem probably will not be too great from the build up of parasite ova.—*F. R. Koutz.* (Biological Abstracts)

TAYLOR, LEWIS W., C. A. GUNNS, C. R. GRAU, and E. LEPKOVSKY. (U. California, Berkeley.)

EFFECT OF A RESPIRATORY DISEASE ON REPRODUCTION. *Poultry Sci. 32:* 129-137. 1953.—A respiratory disease involving infection with *Hemophilus gallinarium* (and possibly some unidentified disease agent) produced severe reduction in egg production, egg quality, and hatchability. Long-term incapacitation of hens was very high, and first-year egg production was reduced to about half the normal level. Embryonic mortality was greatly increased during the first 2 weeks of incubation and certain anomalies were produced. Non-pausing pullets resistant to the disease had significantly higher hatchability than pullets that paused following the disease outbreak. Attempts to improve egg quality and hatchability by vitamin B_{12} injection and by aureomycin and green feed supplements failed.—*L. W. Taylor.* (Biological Abstracts)

POULTRY PRODUCTS AND MARKETING

BRANT, A. W., K. H. NORRIS, and GILBERT CHIN.

A SPECTROPHOTOMETRIC METHOD FOR DETECTING BLOOD IN WHITE-SHELL EGGS. *Poultry Sci. 32:* 357-363. 1953.—

The spectral characteristics of intact eggs and egg components were detd. When blood was present the wave lengths of light near 575 mμ were consistently absorbed. Instrumentation was developed in which intact eggs could be automatically scanned between 585 and 565 mμ and the relative transmittance recorded. From the recorded curves on 600 eggs it was possible to segregate eggs containing no blood with 99.7% accuracy. Eggs containing blood spots over 1/8 inch in diam. or with bloody whites were identified with 98.1% accuracy. Only 28.6% of eggs containing blood spots less than 1/8 inch in size were identified.—*A. W. Brant.* (Biological Abstracts)

CONNER, J. W., E. S. SNYDER, and H. L. ORR. (Ontario Agric. Coll., Guelph, Canada.)

THE INFLUENCE OF WASHING AND OILING ON GRADE AND BACTERIAL CONTENT OF EGGS STORED FOR A NINE MONTH PERIOD. *Poultry Sci. 32:* 227-235. 1953.—Clean eggs untreated, oiled, and oiled with 0.25% Dowicide 7 incorporated in the oil, were stored for 9 months at 30° ± 1°F. Eggs from each group were graded and examined bacteriologically during this storage period. There was very little difference in the percent of Grade A eggs between treatments until the 4th month when the eggs washed in cold water and unoiled showed a definite decline. No marked decline in quality between the washed and unwashed oiled eggs was indicated by the percentage of eggs grading A. Little significant difference could be noted between the various groups in percentage of eggs with viable bacteria as indicated by growth on tryptone glucose extract agar, in percentage of eggs containing viable anaerobic bacteria, and coliform bacteria, or in average plate counts per ml. Declines noted in percentage of Grade A eggs were almost entirely due to physiological changes in the egg, rather than to bacterial action.—*H. L. Orr.* (Biological Abstracts)

CONNER, J. W., E. S. SNYDER, D. MacDOUGALL, and H. L. ORR. (Ontario Agric. Coll., Guelph, Ontario, Canada.)

EXPERIMENTS WITH THE PREPARATION AND STORAGE OF TURKEY STEAKS. *Poultry Sci. 32:* 208-216. 1953.—The storage life of turkey steaks, yield of steaks from several sizes of birds, bacterial flora, oxidation of turkey fat and effect of mono-Na glutamate on flavor of steaks was studied. There was considerable variation in number of viable bacteria present in individual steaks, freezing bringing about a marked reduction in viable bacterial population. A progressive reduction in bacterial counts occurred with length of storage at -10°F. up to 14 months. Coliform bacteria were present in most steaks prepd. from normally eviscerated birds while they were absent in steaks prepd. aseptically. Storage life of these steaks in household refrigerators was 3 days or less. Mono-Na glutamate in low concns., while slightly enhancing flavor of fresh steaks, accentuated the "off" or "fishy" flavors of steaks stored over 2.5-3 months at -10°F. The various chemical methods for detn. of rancidity in turkey steak fat indicated a gradual deterioration of fat from 2 to 14 months' storage at -10°F.—*E. S. Snyder.* (Biological Abstracts)

DAWSON, L. E., and H. R. RICHARDSON.

BLOOD AND MEAT SPOTS IN CHICKEN EGGS. *Michigan State Coll. Agric. Expt. Sta. Quart. Bull. 35:* 110-119. 1952.—The incidence of blood and meat spots varies greatly among breeds and strains of poultry. Leghorn eggs contain fewer meat spots, but about the same number of blood spots as brown shelled eggs. Frequency of spots increases during the pullet laying year from Sept. to Aug., but declines in the 2nd and 3d laying year. Inheritance appears to play a very important role in the control of spot incidence. Over half of the spots were on the yolk, and about equal numbers were in the chalazae and in the albumen. Spots on the yolk were mostly red, whereas most of the spots in the albumen were white. Spots in the chalazae were intermediate in color.—*Authors.* (Biological Abstracts)

ERASMUS, J. E., and C. R. LIEBENBERG. (Stellenbosch).
WEIGHT LOSSES IN TABLE POULTRY. *Farming in South Africa 27:* 314: 295-297. 1952.—An experiment was conducted with three purebreds consisting of Black Australorps, White Leghorns and Light Sussex and crosses between these breeds. The birds were placed in fattening coops at 12, 16 and 20 weeks respectively and 3 birds from each mating killed weekly. The following results were obtained: (1) In the slaughter process the weight loss in both males and females was greater in the lightest than the heaviest bird. (2) In cocks, age had no significant influence on the slaughter weight losses. In hens the slaughter weight losses decreased as the age increased from 12 to 16 weeks. (3) Fattening periods of 2 to 3 weeks showed no difference in slaughter weight losses. (4) The Light Sussex had on the average less feathers than any of the other purebreds or crosses. In females the weight of feathers per unit weight of body exceeded that of males. (5) Differences in the losses in blood between the sexes were attributed to larger quantities of fatty tissues in females.—*A. M. M. Gericke.*

ERASMUS, J. E., and C. R. LIEBENBERG. (Stellenbosch).
A NUMERICAL CRITERION OF CONFORMATION IN TABLE BIRDS. *Farming in South Africa 27:* 318: 443-446. 1952.—In this study the weight of meat on the left of the breast bone was taken as a criterion of the amount of flesh on the carcass and its plumpness. By means of regression coefficients of breast muscle weight on carcass weight it was found that both sexes of the White Leghorn developed more breast meat per unit of weight than Black Australorps, Light Sussex and the respective crosses. In breast width White Leghorn hens were superior to the other two pure-breds. Both sexes of the Sussex and Leghorn had longer breast bones than the Australorp. In body depth the latter breed was again superior to the others. The differences between the mean adjusted shank lengths were small. Females had no significant effect on shank length whereas Sussex males had longer shanks than Australorps. —*A. M. M. Gericke.*

FISCHER, CHARLES M. (Oregon Agric. Expt. Sta., Corvallis.)
STUDIES IN TURKEY MARKETING IN THE WESTERN STATES. *Spec. Rept. Utah Agric. Expt. Sta. 6.* 5-16. 1952.—This report reveals that the Pacific Coast and Rocky Mountain states face increasing competition in selling their turkeys in eastern markets. This development is the result of substantial increases in the production of turkeys during the past 20 years in areas adjacent to the large consuming centers. The increase in per capita production in these regions has been more rapid than the increase in per capita consumption. Twenty years ago the N. Atlantic, East N. Central, and S. Atlantic regions produced slightly more than 1/4 of their requirements for turkey meat; in 1949 these regions were producing up to half of their requirements. Unless some development can halt or reverse the trend now under way, western growers will soon be forced to make a critical appraisal of their position in the production of market turkeys. The western turkey industry has several alternatives ahead in adjusting to this new production-consumption relationship. The industry could curtail production. This might come about through elimination of less efficient producers. Another alernative is to expand the market for western turkeys. Efficiencies in production and marketing may enable western growers to market turkeys at reasonable prices and still make a satisfactory profit margin. As turkeys become "good buys" for the consumer, it is possible that the average per capita consumption of the West may be increased. Another possibility lies in the shift from the production of large turkeys to the production and marketing of a smaller variety of turkeys. This would include the "family size turkey" and the turkey broiler which has been introduced only recently. Another way of improving the market is to institute better methods of marketing the large turkeys now produced in the western region. Many steps have been taken in this direction through the merchandising of turkey halves, quarters, and turkey pieces.—*C. M. Fischer.* (Biological Abstracts)

JOHNDREW, O. F., JR.
MARKETING RESEARCH IN THE POULTRY BRANCH. *Amer. Egg and Poultry Rev. 14:* 22, 24, 26. 1952.—This article deals with technological studies on eggs and poultry from July 1, 1949, to June 30, 1952. No scientific data are given.—*H. G. Lindquist.* (Biological Abstracts)

JONES, OSCAR, and F. E. DEATHERAGE. (Ohio State U., Columbus.)
THE DIETHYLSTILBESTROL CONTENT OF THE MEAT FROM CHICKENS TREATED WITH THIS ESTROGENIC SUBSTANCE. *Food Res. 18:* 30-34. 1953.—Diethylstilbestrol was detd. in necks, livers, and muscle tissue of chickens receiving implants of 15 mg. at the base of the head. Six chickens received a fat type pellet and 4 received an aqueous pasty suspension of this hormone. No significant amts. were found in livers and breast muscle plus abdominal fat. Pellet residues in the 6 chickens averaged 3970 μg. From 4 chickens receiving aqueous pasty suspension, residues averaged 280 μg. with 2 out of 4 having no detectable amts. Results indicate that hormone implants should be placed in the bird so that upon dressing the site of implantation will be discarded and not reach the consumer.—*Authors.* (Biological Abstracts)

KLOSE, A. A., H. L. HANSON, E. P. MECCHI, J. H. ANDERSON, I. V. STREETER, and HANS LINEWEAVER. (West. Reg. Res. Lab., Albany, Calif.)
QUALITY AND STABILITY OF TURKEYS AS A FUNCTION OF DIETARY FAT. *Poultry Sci. 32:* 82-88. 1953.—Equivalent groups of bronze turkeys were fed for 17 weeks prior to slaughter on the following 7 diets: (1) practical ration; (2) simplified, essentially fat-free basal diet; the basal diet supplemented with 2% levels of (3) beef fat; (4) corn oil; (5) soybean oil; (6) linseed oil; and (7) sardine oil. The frozen eviscerated carcasses were evaluated initially and after 6, 12, and 18 months' storage at 0°F. for peroxides and aldehydes in the raw depot fat and for fishy and rancid off-flavors and odors in the roasted carcass. Degree of fishy off-flavor was in general inversely related to the induction period, or directly related to the amt. of highly unsaturated (3 or more double bonds) fatty acids in the carcass fat. 2% sardine oil in the diet produced intense fishiness in the cooked carcass, 2% linseed oil resulted in moderate fishiness, and a stock diet contributing about 0.4% fish oil produced carcasses with slight fishiness. The degree of fishy off-flavor did not increase during storage. Both peroxide and aldehyde contents were inversely related to the induction period of the carcass fat. Percentage differences in rancid off-flavor and odor between diet groups were not as large as the percentage differnces in peroxides or aldehydes, but the orders of increasing values by groups were quite similar.—*A. A. Klose.* (Biological Abstracts)

KYRNING, S. (Natl. Inst. Publ. Health, Tomteboda, Stockholm.)
ON THE CHEMICAL ASSAY OF VITAMIN A AND CAROTENOIDS IN HEN'S EGGS. *Internatl. Rev. Vitamin Res. 24.* 263-271. 1952.—Eggs were homogenized, then saponified with hot methanolic KOH. The unsaponifiable extract was dissolved in petroleum ether. This soln. was chromatographed on $CaCO_3$ using acetone in petroleum ether for development. The vit. A + cryptoxanthin + beta-carotene were collected in the eluate. The 2 carotenoids were estimated together absorptiometrically. The vit. A was estimated with $SbCl_3$ and a correction applied for the carotenoids. The lutein remaining on the $CaCO_3$ was eluated with ether and estimated absorptiometrically. The standard deviation, calculated from 96 duplicate vit. A analyses, was ± 3%. The recovery of vit. A added to eggs averaged 97%.—*V. H. Booth.* (Biological Abstracts)

NASH, (Sister) AGNES MARIE, HELEN L. MAYFIELD, and LURA M. ODLAND. (Montana State Coll., Bozeman.)
PHYSICAL, CHEMICAL AND COOKING QUALITIES OF EGGS AS AFFECTED BY FIVE METHODS OF HOME PRESERVATION. *Poultry Sci. 32:* 275-284. Illus. 1953.—Methods of preservation studied

were: waterglass, freezing, creamy emulsion, oiling, and plastic coating. The eggs were stored at 50-60°F. and tested at the end of 3 and 6 months for the following qualities: change in weight during storage; height, width and index of albumen; color and height of yolk; pH of albumen; palatability of cooked yolk; acceptability for poaching; coagulating ability when used in baked custards; and whipping and baking value as detd. in the making of sponge cakes. When the quality rations were considered, fresh, preserved, and no-treatment eggs were ranked in order of desirability as follows: fresh, creamy emulsion, waterglass, oiling, plastic coating and no treatment.—*Auth summ.* (Biological Abstracts)

PRATER, A. R.

EFFECT OF GAS PACKING AND STORAGE TEMPERATURE ON THE KEEPING QUALITY OF SPRAY DRIED WHOLE EGG POWDER. *Australian Jour. Sci. 1:* 224-234. 1950.—The storage life of spray-dried whole egg powder, when measured by organoleptic and dispersibility tests, is considerably prolonged at 10 to 30°C. by packing in CO_2; packing in N gives a smaller increase. Oxygen uptake by the powder was measured and its influence on deterioration during storage is discussed.—*Auth. summ.* (Biological Abstracts)

SNYDER, E. S., and H. L. ORR. (Ontario Agric. Coll., Guelph, Canada.)

MARKET POSSIBILITIES AND YIELDS OF GOSLINGS DRESSED AT VARIOUS AGES. *Poultry Sci. 32:* 181-182. 1953.—Goslings from a common source in regard to breeding and feeding were dressed at seven intervals from 5 to 19 weeks of age. Data are presented, showing the avg. wts. of the live, dressed and parts of goslings processed at the several ages, also the % of various parts based on chilled wts. The yield of edible parts of representative carcasses is given and the % of edible meat based on live, chilled and eviscerated wts.; also % of bones based on live wt.—*Authors.* (Biological Abstracts)

STOTTS, C. E., and M. I. DARROW. (Res. Lab. Swift and Company, Chicago.)

YIELDS OF EDIBLE MEAT FROM CORNISH CROSSBREDS, NON-CORNISH CROSSBREDS, AND PUREBRED BROILERS. *Poultry Sci. 32:* 145-150. 1953.—Total edible meat yields, breast yields, and meat to bone ratios were detd, for representative stocks of Cornish crossbreds, non-Cornish crossbreds, and purebreds. 400 broilers from ten breeds and crosses were studied. All birds were raised, dressed, and processed under uniform conditions. The effect of body wt. on yields was eliminated by standardizing wts. for broilers at both 9.5--10.5 weeks and 10.5-11.5 weeks. Edible meat yields were obtained by cooking each bird in boiling water for 2 hours, removing flesh, and drying bones with a towel, edible meat yield being detd, as difference between bone weight and uncooked carcass. Cornish crossbreds gave significantly higher edible meat yields of 0.80% of drawn wt. than purebred and non-Cornish crossbreds. Cornish crossbreds gave slightly higher breast yields than other stocks. Females gave edible meat yields higher than males but not significantly so. The data indicate that breeding of commercial broilers to present time has not materially influenced yields of edible meat.—*Authors.* (Biological Abstracts)

SWANSON, M. H. (U. Minnesota, St. Paul.)

A PROPOSAL FOR THE USE OF CARBON DIOXIDE IN RETAIL EGG CARTONS. *Poultry Sci. 32:* 369-371. 1953.—The value of CO_2 as an aid in preserving the quality of cartoned eggs passing through normal trade channels was tested. Eggs were packaged in conventional one-dozen size molded cartons, in cartons overwrapped with a moisture-vapor-proof plastic, and in overwrapped cartons containing an atmosphere enriched in CO_2. Brokenout scores indicated that lots held under CO_2 yielded 2-3 times as many USDA AA and A grade eggs as the controls at the end of a 7-10 day storage period at 60-80°F. The use of a moisture-vapor proof carton without added CO_2 was about as efficient as oiling in the preservation of quality.—*M. H. Swanson.* (Biological Abstracts)

MANAGEMENT

COTTERILL, O. J., and A. R. WINTER. (Ohio State U., Columbus.)
SOME NITROGEN STUDIES OF BUILT-UP LITTER. *Poultry Sci. 32:* 365-366. 1953.—Superphosphate, gypsum, pulverized limestone and hydrated lime rated in the order listed for reducing the pH of built-up poultry house litter and increasing its N content, when added at about a 5% level by wt.—*A. R. Winter.* (Biological Abstracts)

GODFREY, GEORGE F., D. E. HOWELL, and FRANKLIN GRAYBILL. (Oklahoma A. and M. Coll., Stillwater.)
EFFECT OF LINDANE ON EGG PRODUCTION. *Poultry Sci. 32:* 183-184. 1953.—85 New Hampshire pullets were randomly assigned to 8 pens. 4 pens were sprayed to the point of run-off with a 0.5% emulsion made from a 25% emulsifiable concentrate of lindane (99.5% gamma isomer of benzene hexachloride). 4 pens served as controls. The use of 0.5% lindane spray caused no detrimental effect on egg production or livability during an 8-wk. period when the avg. daily high temp. was 92.9°F.—*G. F. Godfrey.* (Biological Abstracts)

HENDERSON, D. C., H. C. WHELDEN, JR., and G. M. WOOD. (Vermont Agric. Expt. Sta., Burlington.)
RANGE AND CONFINEMENT REARING OF POULTRY. *Bull. Vermont Agric. Expt. Sta. 568.* 1-8 Illus. 1953.—Pullets reared in confinement were compared with those on different grass and legume pastures. The plots of Kentucky bluegrass and orchard grass maintained their original stands throughout the 3-yr. trials. Ladino clover, although not as long-lived, was superior to the grasses in palatability and produced approximately 35% more forage in the summer period. A saving of over 14% in purchased feed was obtained for the birds on range, compared with the birds in confinement, from the 16th to the 24th week. The body wt. of confinement- and range-reared pullets was essentially the same at maturity.—*H. C. Whelden, Jr.* (Biological Abstracts)

HENDERSON, E. W.
PERCENTAGE MORTALITY OF PULLETS IN THEIR FIRST LAYING YEAR COMPARED WITH SURVIVORS THE SECOND YEAR. *Michigan State Coll. Agric. Expt. Sta. Quart. Bull. 35:* 120-124. 1952.—The avg. rate of mortality of approx. 650 pullets per year for 5 yrs. was 17% as compared with 14% for their retained flock mates during their 2d laying yr. The difference is statistically significant. Breeds consisted of approx. equal numbers of White Leghorns, Dark Cornish and various cross-bred combinations of the 2 breeds. There was a marked decline in the mortality rate of all pullet progeny per yr. from 1945 to 1949 (29 to 8%), but the mortality rate of pullet progeny in the 5th year (1950) was 19%. The utility of the information in management practice is suggested.—*E. W. Henderson.* (Biological Abstracts)

MUELLER, CLYDE D., and ROBERT COOMBS. (Kansas State Coll., Manhattan.)
ACCURACY OF PART-TIME TRAPNESTING ON AN INDIVIDUAL AND FAMILY BASIS. *Poultry Sci. 32:* 263-267. 1953.—Trapnest records for 219 White Leghorns and 747 White Plymouth Rocks were analyzed. The avg. deviation between the total daily egg record and the production record estimated by 3-day weekly trapnesting was 1.4 eggs for sire families, 3.3 eggs for dam families, and 5.4 eggs for individual pullets. Corresponding deviations based upon 2-day weekly trapnest records were 1, 5, and 8.9 eggs, respectively.—*C. D. Mueller.* (Biological Abstracts)

PLATT, C. S. (Rutgers U., New Brunswick, N. J.)
MAINTAINING WINTER EGG PRODUCTION BY THE USE OF DIM RED LIGHT. *Poultry Sci. 32:* 143-145. 1953.—White Leghorn pullets exposed to light from 10-watt red bulbs from 8 p.m. to 4 a.m. produced as many eggs during the winter months as birds on a standard

system of white light to maintain a 14-hr. day. The red bulbs were placed directly over the perches at a height of 18 inches and spaced 4 feet apart. No section of the perches was more than 36 inches from a bulb. The fowls did not leave the perches at any time during the night, their feeding hrs. being restricted to normal daylight hrs. Both groups exposed to the artificial light, red or white, gave significantly higher production than birds not supplied with artificial light. A mash and grain feeding system was followed, with dry mash constantly available and grain fed in hoppers for 1 hr. in the late afternoon.—*C. S. Platt.* (Biological Abstracts)

RETIEF, J. C. D. (Middelburg, C.P.)
LAYING BATTERIES. *Farming in South Africa 28:* 325: 131-134. 1953.—The management of laying batteries and the types of houses are described as well as nutrition, choice of breeds, mortality, replacement of stock and the advantages and disadvantages of batteries.—*A. M. M. Gericke.*

GENERAL

De BEER, J. A. (Glen.)
CENTRAL EGG LAYING COMPETITION. TWENTY-SIXTH OPEN COMPETITION AND EIGHTEENTH TEST OF THE REGISTERED BREEDERS ASSOCIATION. *Farming in South Africa 28:* 327: 212-216. 1953.—The average production per hen in the Open Test was 214 and in Breeders Register 219 eggs in 48 weeks. In this test 885 hens were entered and the mortality was 11.7 per cent which is a reduction of 0.6 per cent on that of the previous contest. The mortality was caused by lymphoid leucosis, internal haemorrhage due to fatty degeneration of the liver and fowl paralysis. Breeders are advised to pay more attention to breeding of birds with stamina, elimination of cancer in families, egg size and quality of egg shells.—*A. M. M. Gericke.*

HALE, R. W. (Min. Agric. Northern Ireland, Belfast.)
EXPERIMENTAL ERRORS IN LAYING EXPERIMENTS. *Jour. Agric. Sci. 42:* 347-352. 1952.—The author concludes that in laying expts. on a semi-intensive plant, the egg records are seldom affected to any serious extent by differences between pens that are treated similarly. Non-random allocation of pullets to the laying pens does not appear to have seriously affected the results on which this conclusion is based. The distribution of egg records from a high-producing flock is likely to be extremely skew and leptokurtic.—*R. E. Burns.* (Biological Abstracts)

MOORE, J. S., and N. R. MEHRHOF. (Florida Agric. Expt. Sta., Gainesville.)
PORTABLE ALL-PURPOSE POULTRY HOUSE. *Circ. Florida Agric. Ext. Div.* 111. 1-7. Illus. 1952. (Biological Abstracts)

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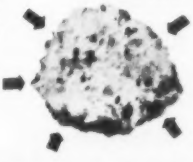

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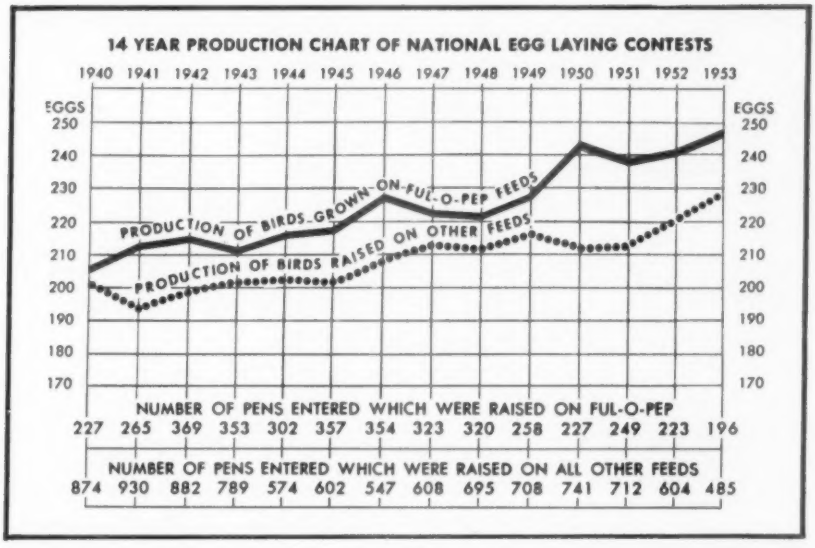
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1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953
EGGS
250
240
230
220
210
200
190
180
170
PRODUCTION OF BIRDS GROWN ON FUL-O-PEP FEEDS
PRODUCTION OF BIRDS RAISED ON OTHER FEEDS
NUMBER OF PENS ENTERED WHICH WERE RAISED ON FUL-O-PEP
227 265 369 353 302 357 354 323 320 258 227 249 223 196
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